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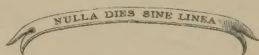
HAND-BOOK
OF
VENESECTION
— PRACTICE AND THEORY —
DUTTON

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256

VENESECTION

A BRIEF SUMMARY OF THE PRACTICAL VALUE OF VENESECTION IN DISEASE

FOR STUDENTS AND PRACTICIANS
OF MEDICINE

BY

WALTON FOREST DUTTON, M.D.

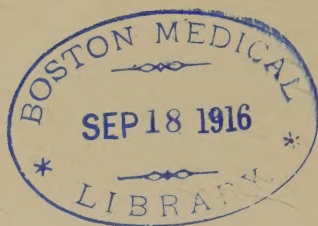
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Advancement of Science; American Academy of
Political and Social Science; International
Congress on Tuberculosis, etc.

Illustrated with Several Text Engravings and Three Full-page
Plates, One in Colors



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THIS VOLUME
IS DEDICATED TO MY MOTHER,
WHOSE SELF-SACRIFICE MADE IT POSSIBLE FOR
ME TO STUDY MEDICINE, AND TO MY WIFE,
WHOSE FAITHFUL SERVICES HAVE ASSISTED ME IN
FULFILLING THE OBLIGATIONS OF MY PROFESSION.

PREFACE.

FREQUENT requests from general practitioners for a book on venesection, especially adapted to their needs, have prompted the writer to endeavor to meet these demands.

In preparing this work on venesection, it has been my purpose to apply to the every-day problems of the practice of medicine the knowledge with which the general practitioner should be familiar. Physicians and students have long felt the need of such a work. The author does not claim the book to be a treatise on disease. The book is meant to give, in a concise and convenient way, the therapeutic value of an agent which has been used successfully by some of the most eminent physicians of past centuries, and will continue to be used as long as the human body is heir to disease. The advances in medicine and surgery require a serious consideration of the greater conditions remaining before us, and upon the medical profession the laity depend for the alleviation and cure of disease.

The neglect of scientific venesection, as a therapeutic agent, has been recognized by some of the foremost medical men of our time, yet it remained for someone to present the subject logically to the profession.

I am impressed by the need of such a book which describes, in detail, the procedure of venesection and

its applications. In the hour when all other therapeutic agencies have failed, I have resorted to the lancet to see the livid hue, which mapped the way to an early death, give way to the rosy glow and bright light of health. The opportunity to save a life is when we have all our armamentarium at hand for the use of our mental laboratory. If we deny that venesection is an effective agent in the treatment of disease, we have to deny, also, the fundamental principles of physiology and repudiate our medical teaching.

I wish, therefore, to present, not alone my own clinical experience, but that of eminent physicians in the endeavor to give the profession the experience of those who have secured results. Some authors I have quoted verbatim, while others I have abstracted, but, at all times, using the language which seemed to give the best description of the subject.

It is my desire to place this book on a firm basis as a work of ready reference. The author would gladly acknowledge any suggestions as to errors, corrections, or omissions.

W. F. D.

TULSA, OKLA.

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VENESESECTION.

DEFINITION.

THE word venesection is from the latin *vena*, a vein, and *secare*, to cut, and means the opening of a vein for the purpose of letting blood. The term "Bloodletting" includes all methods of withdrawing blood from the animal or human body for therapeutic purposes. The withdrawal of blood from a large vein or artery, so as to reduce the general mass of blood, is known as "general bloodletting." The abstraction of blood from a part or its immediate neighborhood (*i.e.*, from the capillaries) by leeching, scarification, or cupping, is termed "local bloodletting."

THE HISTORY OF BLOODLETTING.*

BY FIELDING H. GARRISON.

Someone has said that when prehistoric man first hit upon the expedient of picking up a stick or a stone with which to smite his fellow-man, he had already made his first step in the direction of civilization. If he drew blood on that momentous occasion, in some degree short of manslaughter, we

* Read before the Medical History Club of Washington, D. C., December 30, 1911.

should already have an instance of bloodletting. It was in some such empirical way as this that early man first chanced upon venesection as a reliable mode of treatment in the relief of human suffering, through witnessing the revulsive effects of some accidental hemorrhage upon bodily ills. The natural and periodic process of menstruation, no doubt, directed the medical mind to the hygienic and prophylactic advantages of depletion; but we can as little credit Pliny's fable of how the Egyptians learned to open a vein from watching the clumsy hippopotamus wound itself against the reeds as that other bit of nature-fakery of the old naturalist which asserts that they assimilated the use of the enema from seeing the ibis achieve a species of autoclyster by means of its bill. Bloodletting is one of the oldest and most common of therapeutic devices and its origin is lost in antiquity. We know, from Max Bartels and other writers on primitive medicine, that savages have used sharp thorns or roots, fishes' teeth, or sharpened stones for opening abscesses, couching cataracts, or letting blood; that scarification was resorted to, that cupping was done by means of animals' horns, and that, in connection with the general idea of depletion, the North American Indians had fixed periods, such as the "green-corn feast," for ritual emesis and purgation, even as our forefathers used Purgation Calendars and Bloodletting Calendars to determine the proper time and place for these operations under the signs of the Zodiac, or as those of only one generation ago went to the old country doctor every spring to have their veins opened. Of

the ancient Egyptians, Herodotus says, "They purge themselves every month, three times in succession, seeking to preserve health by emetics and clysters; for they suppose that all diseases to which mankind are subject proceed from the food they use." We learn from the papyric writings that venesection was a common practice among the Egyptians, and, on account of their religious horror of mutilating the human body, was the only surgical procedure permitted by them, with the exception of circumcision. Upon the doorposts of a tomb in the cemetery near Memphis, discovered by Mr. W. Max Müller,¹ we have the earliest known pictures of surgical operations representitng circumcision and two figurations of operation on the foot and neck, the attitude of the patients indicating great pain, the hieroglyphics reading "Why do you hurt me thus?" In the light of the Egyptian restrictions of surgical procedure, it is not unreasonable to suppose that these incisions in the neck and extremities may have been the earliest representations of bloodletting, of date about B.C. 2500.

The Babylonians, in keeping with the ancient passion for prediction and prognosis, tried to make special inferences from the appearance of the blood drawn in venesection, which reminds us of the common assumption in early nineteenth-century practice that "buffing and cupping" of drawn blood was a sign of inflammation.

¹ Described by Dr. James J. Walsh in *Journal of the American Medical Association*, xlix, 1593, 1907.

There are apparently no references to bloodletting in the Bible, but from the Talmud, the Hebrew law book, we learn that venesection, cupping, and leeching were well known among the Jews at the time of its composition, about the second century, A.D.; and it is fair to assume that they were known before that time. If bloodletting was at all practised by the ancient Hebrews, it is possible, if not probable, that it was done with the kind of sharp stone or primitive knife with which Zipporah, the wife of Moses, in the second book of Exodus, "cut off the foreskin of her son." The fact that primitive stone knives were employed by the ancient Egyptians in embalming and by the Hebrews in ritual circumcision shows the extreme veneration in which these rude objects were held, for they go back to the palæolithic period of man's development. In the Hall of Anthropology in the National Museum at Washington one may see hundreds of specimens of these leaf-shaped flints, the sign and symbol of prehistoric man's uplift. In a most important contribution to American archæology, Prof. William H. Holmes,² of the Bureau of Ethnology, has demonstrated inductively (by working out the initial methods of chipping and flaking himself) that even among the recent American Indians of the Piney Branch or other quarries all over the United States, the process of shaping and specializing the leaf-shaped celts from oval or ovoid stones was probably not differ-

²W. H. Holmes, Stone Implements of the Potomac-Chesapeake Tidewater Province, *Report of Bureau of Ethnology*, 1893-4, Washington, xvi, 1-152, 1897.

ent from that employed by palæolithic man or even in what seem to be the rude artefacts of eolithic man. Throughout geological space and time, the leaf-shaped flint knife has remained the same in shape and intention whether as weapon, tool, or ceremonial object, but it is the rough-hewn knife, sharpened as to edge and point by accidental flaking that forms the true connecting link between prehistoric man and the evolution of surgery. In the excavations of the Swiss lake dwellings, which were discovered in 1853, the different cultural objects were found in separate layers, from the Stone Age up to the Copper and Bronze Ages, and of these, the real beginnings of northern European culture are now held to be the bronze implements and objects found at La Tène. On the continent of Europe, the phrase "La Tène" has become a sort of shibboleth among anthropologists for the starting point of the north European culture which followed upon the three Ice Ages, with their two interglacial periods, and this, not because the lake-dwelling finds are necessarily the earliest bronze objects known, but because they are the most representative and characteristic. The La Tène finds, of date about B.C. 300, entirely distinct from Egyptian, Greek, or Indian culture, include earrings of Etruscan or West Celtic pattern and funeral urns containing human remains, showing that cremation was the rule among these people. Some time later, as, for example, in the Gallo-Roman finds in France, we trace the evolution of the articulated surgical instruments, like scissors, in which cutting was done by indirect action. The interest-

ing point is that primitive North European culture, up to the La Tène period, was discontinuous, being interrupted by the three glacial periods, while Greek culture up to the Age of Pericles, two hundred years before, was probably a continuous development, the cutting instruments of metal having been specialized in this southern country as in Egypt or India, before the time of Hippocrates. The date of the La Tène period (B.C. 300) brings us to an interesting phase of the subject, namely, bloodletting among the ancient Hindus. It is not positively known whether the Hindus learned their practical surgery and medicine from the Greeks at the time of Alexander's Indian expedition (B.C. 327) or whether Greek travellers, possibly Hippocrates himself, learned something from them, but this is certain that the *Susruta*, the great canon of Indian surgery, reveals a wonderful knowledge of operative procedure and an extraordinary specialization in the matter of surgical instruments. Nearly all the major surgical operations were performed, except the ligation of arteries, and about 121 different surgical instruments were described, including lancets, scalpels, saws, scissors, needles, hooks, probes, directors, sounds, forceps, trocars, catheters, syringes, bougies, and a rectal speculum. The cutting instruments were of steel, sharp enough to cut a hair and kept clean by wrapping in flannel in a box. Now the remarkable thing about Hindu bloodletting was the way in which venesection or any other cutting operation was taught. Having no anesthesia, the Hindu surgeons recognized that it was necessary to

be swift and sure in incision, and accordingly they first had the young student go through the motions, as it were, on plants. To this end, the veins of large leaves or the hollow stocks of water lilies were punctured and lanced, as also the veins of dead animals. Gourds, cucumbers, melons, and other soft fruits or even leather bags filled with water were tapped or incised, all with the idea of giving a fearless surety and precision in attack, after which the student could proceed to the cadavers of animals and the living subject.³ This method of teaching surgery, which might well be adopted in our own medical schools, was actually employed to some extent in England in the first half of the nineteenth century and, like hypnotism and the "British army bamboo splint," was probably imported by the Anglo-Indian surgeons. Some readers may recall the amusing example in Captain Marryatt's *Japhet in Search of a Father*, in which Mr. Cophagus, the apothecary, teaches the fatherless Japhet to do venesection by the Indian method. "He also taught me how to bleed by making me, in the first instance, puncture very scientifically all the larger veins of a cabbage-leaf, until, well satisfied with the delicacy of my hand and the precision of my eye, he wound up his instructions by permitting me to breathe a vein in his own arm."

Medicine as a science began among the eager, imaginative, quick-minded peoples of Ionia and the islands, and the first textual record of bloodletting in

³ *Encyclopædia Britannica*, 11th edition, xxvi, p. 125.

European practice is to be found in the work of Hippocrates. The Hippocratic writings, as we know, are not an individualized treatise on medicine and surgery, like the works of Galen or Celsus, but a scripture or canon, not unlike the books of the Old Testament, the work of several writers, some of whom lived before the Father of Medicine, some after him. The genuine writings of Hippocrates were all written in Ionic Greek, and, in the opinion of great scholars like Littré, the treatises on Regimen in Acute Diseases, and Ulcers, our principal sources for Hippocratic bloodletting, are beyond question authentic. Hippocrates was undoubtedly a far-greater surgeon than Galen, but in clinical medicine his principal business was the portrayal of the signs and symptoms of important diseases, and for this reason it is customary to slur him over as a therapist, more especially by comparison with Galen. The latter, with the experience of centuries to draw upon, was naturally far more clever in getting his patients well, but that Hippocrates was no laggard in the treatment of disease is evident from the large number of drugs mentioned in the canon, nearly 200 in all, from his careful dietetic scheme, and especially from the fact that his principal service to therapeutics was just along the lines for which the selective, discriminating power of Greek intelligence has been justly famous, namely, in fastening upon what is essential and in throwing out the superfluous. This is precisely the object of the treatises on Regimen in Acute Diseases, and what Hippocrates has to say about bloodletting goes straight to the point:—

“Bleed⁴ in the acute affections, if the disease appears strong, and the patients be in the vigor of life, and if they have strength. . . . Hypochondria when not due to retention of gas, tension of the diaphragm, checked respiration, with dry orthopnea and no formation of pus; more especially intense pains in the liver, heaviness of the spleen, and other phlegmasiæ and intense pains above the diaphragm, diseases connected with collections of humors—none of these diseases admit of resolution if treated at first by medicines, but venesection holds the first place in conducting the treatment. . . . When a person suddenly loses his speech, in connection with obstruction of the veins, if this happen without warning or any other good reason, one should open the internal veins of the right arm and abstract blood more or less according to the habit and age of the patient. Such cases are mostly attended with the following symptoms: Redness of the face, eyes fixed, hands distended, grinding of the teeth, palpitations, jaws fixed, coldness of the extremities, retention of air in the veins [congestion of the brain preceding apoplexy or epilepsy]. . . . In epilepsy or apoplexy, the patients having been first fomented are immediately to be bled at the start while all the peccant vapors and humors are buoyant, for then the cases more easily admit of a cure. In quinsy with convulsive suffocation, the tongue turning livid and hard, bleed in the arm and open the sublingual vein and purge with

⁴ Hippocrates, *Genuine Works*. Translated by Francis Adams, New York, 1886, i, 261, 262, 269.

electuaries and give warm gargles. Peripneumonia and pleuritic affections are thus to be observed: If the fever be acute with pains on either side or both, if expiration be painful, if cough be present and the sputa yellow or livid in color or otherwise thin, frothy, and florid, let the physician proceed thus: If the pain pass upward to the clavicle, the breast, or the arm, the inner vein in the arm should be opened on the affected side and blood abstracted according to the habit, age, and complexion of the patient and the season of the year, and that largely and boldly, if the pain be acute, so as to bring on fainting, after which a clyster is to be given. But if the pain be below the chest and very intense, purge the bowels gently and during the act of purging give nothing."

In his treatise on ulcers, Hippocrates shows how to check accidental hemorrhage after venesection or cupping; how to relieve the soreness after scarification, and points out the most common accident of venesection, namely, phlebitis. He adds that "Venesection is to be practised when the person has dined or drunk more or less freely and when somewhat heated and rather in hot weather than in cold"; also, "When the cupping instrument is to be applied below the knee, or at the knee, it should be done, if possible, while the man stands erect.⁵ It is a matter of comment that there is no mention of bloodletting in the famous surgical treatise on Wounds of the Head, but one of the aphorisms says, "When a

⁵ *Ibidem*, ii, 306.

man has pain in the back part of the head, he will be benefited by having the straight vein in the forehead opened." And we know that Ambroise Paré practised venesection in head injuries on the authority of the Father of Medicine. Such are the Hippocratic rules for bloodletting which became the basic principles for its practice in aftertime.

Greek medicine was established in Rome by Asclepiades of Prusa, who opposed the humoral pathology of Hippocrates and his ideas about the healing power of Nature. Professor Huxley relates that he was once talking with an eminent, fashionable physician about the *vis medicatrix naturæ*, when the latter replied: "Stuff! Nine times out of ten Nature does not want to cure the man; she wants to put him in his coffin!" Asclepiades was a fashionable physician of this kind. He believed in systematic interference with morbid processes, and, in a well-worn phrase, referred to the clinical observations of Hippocrates as "a meditation on death." Yet his actual therapy, when he came down to cases, was not very different from that of the Coan physician, and was limited to such strenuous expedients as diet, massage, hydrotherapy, gymnastics, and a little wine; in short, what we now call physiological therapeutics. He was opposed to drastic purgation and emesis, but favored bloodletting, the principal indication being the relief of pain.

Celsus regarded bloodletting as a principal means of extracting morbid material from the body, and he begins his very concise chapter on venesection⁶

⁶ Celsus, *On Medicine*. Translated by Alex. Lee, London, pp. 99-106, 1831.

with the following sentence: "It is not a new practice to let blood by the incision of a vein, but it is new to embrace this remedy in almost every disease." This statement shows the direction in which things were moving at the time of Celsus and, having made it, he advances at once to the common-sense standpoint that the true indication is not the disease or condition of the patient, but whether the patient is strong enough to be bled. In all doubtful cases where there is no time for hesitation, as "in paralysis, loss of speech, suffocative angina, or between two violent febrile paroxysms," it is better to try a doubtful remedy than none at all, but to let blood during the violence of a fever, in the acme of its paroxysm, is deliberate homicide. Wait for a remission, yet, failing this, the last resort is still not to be omitted. Celsus follows Hippocrates in recommending that the vein be opened on the same side as the lesion, but he intimates that the other method, the so-called derivative bleeding, on the opposite side or as far away as possible from the lesion, was already coming into vogue. This was to be the special feature of Arabian practice in later centuries and may have come originally from the East. Celsus is also at one with Hippocrates in the idea that bloodletting is good if the drawn blood is thick and dark—the buffy-coat idea—but, if it is red and clear, it is a sign that the bleeding should be stopped immediately. Finally, what Celsus says about the necessity of proper instruction in bloodletting shows the wisdom of the ancient Hindus in practising upon the veins of plants:—

“Although venesection be very easy to a practised man, yet to the unskillful it is most difficult. For the vein being joined to the arteries, and the nerves to these, wherefore if the lancet should touch the nerve, convulsions ensue, and that cruelly destroys the man. But a wounded artery neither unites nor heals; sometimes it causes profuse hemorrhage. Also if the vein itself happens to be divided and the extremities by chance compressed, no blood is emitted. But if the lancet be thrust timidly, it lacerates the skin without opening the vein. Also the vein sometimes lies hidden, neither is it easily discovered. Thus many things concur to render this a difficult operation to the tyro, which is very easy to a scientific physician.”⁷

Galen was a great and resourceful practitioner noted for the extreme cleverness of his prescriptions and his remarkable originality in treatment, as where he recommends, for the first time in medical history, the milk diet and sea voyages for phthisis. As the archcommentator on Hippocrates, it was natural that he should be very expansive on the subject of venesection, to which, in fact, he devoted an elaborate treatise. He was the first to introduce the quantitative idea in bloodletting, recommending from seven ounces to one and a half pounds as a normal quantity to be extracted in the average case. Like all the Greeks, he was opposed to derivative bleeding and sometimes even opened an artery. He carried bloodletting into a great va-

⁷ *Ibidem*, 104-105.

riety of conditions, among them diseases of the liver and spleen, sciatica and coxalgia, insanity and melancholia, rheumatism, fractures, hemorrhages, and cerebral irritation, and it was probably upon Galenical authority that the practice was extended to almost every ailment in later times.

Rufus of Ephesus, who was the first to describe bubonic plague, employed bloodletting in his treatment of the disease.

Aretæus the Cappadocian is usually supposed to have lived about the same time as Galen, or perhaps even later, because his descriptions of disease are the most complete and graphic of all the Greek writers, and his literary style has that ornate, elaborated character which is usually regarded as the sign of a period of social decadence. At all events, he wrote the best treatise on practice of medicine in antiquity, and his wonderful clinical pictures bring the Greek period to a splendid close. Aretæus, like Galen, recommends bleeding in a long array of diseases, not only in epilepsy, pleurisy, and the anginas, but in intestinal obstruction, tetanus, diseases of the bladder, satyriasis, suppression of the urine, hemicrania, and hemoptysis; and, with him, venesection is highly specialized, the blood being drawn from the frontal vein in headache, epilepsy, and vertigo, from the veins of the tongue in throat affections, from the nasal veins in hemoptysis and headaches, with scarification at the pubes or venesection of the ankle in cases of hysteria. This was the beginning of the complex system of "points of election" which was afterward a special

feature of the bloodletting calendars. Aretæus, like Galen, also indicates the quantity of blood to be let,—about half a pint or more in headaches, for instance.

During the Dark Ages, which for medicine we call the Byzantine period, the science of physic was put into very cold storage. As Sir Clifford Allbutt says: "The chief monuments of learning were stored in Byzantium until Western Europe was fit to take care of them." The most important writer who has been preserved in the Byzantine texts was the great surgeon Antyllus, who gives most careful directions as to the technique of venesection and himself sometimes opened the occipital, auricular, frontal, and temporal arteries. The famous Antyllus operation for aneurism, which consisted in ligating above and below the sac and then cutting down and evacuating its contents, was, in reality, a mode or subvariety of bloodletting.

The Arabians, as devout followers of Galen, were enthusiastic bloodletters, whether on the battlefield or at the bedside, but their clinical practice had the novel feature that venesection was required to be derivative, on the opposite side from the lesion, against the old Hippocratic rule of revulsion. This opposition between derivative and revulsive bleeding led, as we shall see, to a controversy of phenomenal dimensions in the sixteenth century.

Medieval medicine—medicine under the Christian church—had its origins in the School of Salerno, the earliest literary production of which was the *Regimen sanitatis*, or Code of Health, a twelfth-

century poem, composed for the benefit of King Robert of Normandy, who was cured of a wound at Salerno in 1101. The *Regimen sanitatis* consists of a number of wise laws relating to diet and personal hygiene, written in Latin hexameter verses with concealed rhymes (the so-called leonine verse), each stanza being detached from and independent of the others, like so many beads upon a string. This poem, which passed through some 240 different editions and was translated into the known languages, winds up with a special section on blood-letting, illustrating the Salernitan practice, largely derived from the Arabic writers. The Latin poem itself is by no means what the Germans would call a "right royally pitiful rhyme," for the diction is elegant. It was translated into English five times and the subjoined quotation is from the amiable version of Professor John Ordranax:—

93.

Of Bleeding and of the Age of Bleeding.

Ere seventeen years we scarce need drawing blood;
High spirits fall by tapping life's own flood.
Wine may restore a wanted joyous mood,
But loss of blood is late repaired by food.
Bleeding the body purges in disguise,
For it excites the nerves, improves the eyes
And mind, and gives the bowels exercise.
Brings sleep, clear thoughts, and sadness drives away,
And hearing, strength, and voice augments each day.

94.

In what Months it is Proper, and what Improper to Bleed.

Called lunar, are September, April, May,
Because they move beneath the Hydra's sway.
Two days—September first, May thirty-first—
For bleeding and for eating goose are cursed.
When blood abounds in full age or in youth,
May'st bleed in any lunar month, forsooth;
Yet chiefly in September, April, May,
Bleed freely, if you would prolong life's day.

95.

Of Obstacles to Bleeding.

Cold nature, clime, or when some sharp pain laces;
And after baths that follow love's embraces;
In youth, old age, amid disease's traces;
Or when of food a surfeit overplies
The stomach, and to constant qualms give rise,
Then letting blood is truly most unwise.

96.

Circumstances Relating to Bloodletting.

Whatever amount of blood you wish to let,
Or great, or small, these rules do not forget:
A bath, inunction, cord the arm to bind,
Some wine, a stroll; lose never these from mind.

97.

Of Some Effects of Bloodletting.

Bleeding soothes rage, brings joy unto the sad,
And saves all lovesick swains from going mad.

98.

Of the Size of the Wound in Bloodletting.

A medium-sized incision always make,
Whate'er amount of blood you wish to take;
The copious vapor rising sudden, flees,
And thus the blood escapes with greater ease.

99.

Things to be Considered in Bloodletting.

When one is bled he should for full six hours
Most vigilant maintain his mental powers,
Lest fumes of artful slumber too profound
Should all his mortal nature sadly wound
For fear that thou some slender nerve shouldst mar,
Conduct not the incision deep nor far;
And being purged through blood, and thus renewed,
Haste not at once to sate thyself with food.

100.

Things to be Avoided After Bleeding.

All things from milk as are in gen'ral made,
And draughts of wine, of whatsoever grade,
Should every one dismissed, avoided be
By recent subjects of phlebotomy.
Cold things are also hurtful to the weak,
Nor let them, dauntless, brave damp skies or bleak;
For vigor only comes once more to these
From sunshine mingled with the passing breeze.
To all rest proves an everlasting gain,
While exercise occasions certain pain.

101.

*In what Diseases, Ages, and Quantities Bloodletting
Should Occur.*

Acute disease, or only so in part,
Demands bloodletting freely from the start.
In middle age, bleed largely without fear,
But treat old age like tender childhood here.
In spring you may bleed doubly at your pleasure—
In other times alone in single measure.

102.

What Parts Are to be Depleted and at What Seasons.

In spring and likewise in the summer tide,
Blood should be drawn alone from the side.
In autumn sere, or on cold winter's day,
Take from the left in corresponding way.
Four parts distinct we must in turn deplete—
The liver, heart, the head, and last the feet.
In spring the heart—liver when heats abound,
The head or feet, when'er their turn comes round.

103.

Of the Benefit of Bleeding from the Salvatella Vein.⁸

To mortals there will come superior gain,
From tapping off the Salvatella vein;
It frees the voice, spleen, liver and the chest,
And heart, where'er abnormally distressed.

It is clear from these Salernitan precepts that bloodletting had already become a prophylactic as

⁸ In the little finger.

well as therapeutic device, and, as a definite part of personal hygiene, it became, in due course, immensely popular with the masses. Astrological influences were already creeping in and the time for venesection was soon to be set by the conjunctions of the planets. But the most interesting feature of bloodletting in this period was the evolution of an entirely new figure in the history of medicine—the barber-surgeon. There were great surgeons in the Middle Ages, such as Hugh of Lucca and Theodoric; the pioneers of anesthesia and asepsis, Saliceto, Lanfranc, Guy de Chauliac, Mondeville; yet it cannot be denied that the general practice of surgery, and consequently of internal medicine, fell into what Allbutt styles “unexampled and even odious degradation,” partly through the medieval schism between medicine and surgery which had obtained since Avicenna’s time, partly on account of certain restrictions which the church had to put upon surgical practice by priests and clerics, partly by reason of the many social and legal restrictions which feudal authority put upon both physician and surgeon,⁹ partly because the feudal lords of earth were in position to kill if the surgeon failed to cure, and largely, no doubt, on account of the almost stationary cast of the medieval mind, not to mention the ignorance and incompetence of many of the surgeons themselves. Among the Greeks, the surgeon was held in highest honor. In medieval times, Church and State were not specially enthusiastic

⁹ These have been carefully studied by Sir John Tweedy in *Medical Magazine*, London, xix, 701-706, 1911.

about him and the medical scholastics, those amazing examples of the "discontinuous mind," affected to look down upon him, although far inferior in first-hand knowledge of their profession. It was a case of "give a dog a bad name," with the result that the general practice of surgery fell into the hands of barbers, bath-keepers, sow-gelders, and the strolling "incisors," who, as like as not, put out an eye in couching for cataract, butchered the viscera in cutting for stone, or in attempting to effect a radical cure for hernia, often, as Baas puts it, excised "the radix of humanity itself." No doubt the self-made, outcast surgeon, not properly bred up and educated to his calling, must bear his part of the blame. We find all the leading surgeons of the period—Lanfranc, Guy de Chauliac, Mondeville—giving very shrewd and straightforward advice to their professional brethren as to the necessity of dignified and straightlaced moral conduct in private houses. They were not to flirt with the lady of the house nor to ogle the maidservants, under pain of losing several cubits from their professional stature and possibly their practice. Again, the laws of the Visigoths, the basis of the old Spanish medieval law, state explicitly that "No physician may undertake to bleed a woman in the absence of her relatives; that whoever touched the hand, arm, or breast of a maiden was to be fined; and that if a physician injured a nobleman in bloodletting, he was to be fined." It is plain that immorality and incompetence were common enough among the medieval surgeons of lower caste. The deplorable thing about

the whole matter was that, for centuries, the rank and file of surgeons were under a sort of social ostracism. An English surgeon once said of John Hunter that "He alone made us gentlemen," and, even in protestant Prussia, up to the time of Frederick the Great, it was the duty of the army surgeon to shave the officers of the line. In medieval times, the barber-surgeon attended only to bleeding, cupping, and the dressing of wounds. Medieval surgery was, in fact, merely "wound surgery," and even in such a slight solution of continuity as blood-letting it was the practice to give a "wound-drink" to strengthen the patient. The major operations were in the hands of specialists, often hereditary in certain families. Internal medicine was in the hands of scholastics, whose knowledge of Greek medicine was derived almost entirely from translations into Arabic, Hebrew, or other Oriental languages. Renan, as cited by Allbutt, speaks of a medieval university textbook, an edition of Aristotle, which consisted of a Latin translation of a Hebrew translation of an Arab commentary upon an Arab translation of a Syriac translation of the Greek text.¹⁰ It was under such influences as these that the medieval physicians began to give up the old Greek practice of bleeding upon the affected side in favor of the Arabic method of derivative bleeding upon the opposite side. All the clinical writers of the period, the so-called Arabists, Gilbert of England, Peter of Abano, Arnold of Villanova, Gentilis

¹⁰ Sir T. C. Allbutt, *Science and Mediæval Thought*, p. 69, London, 1901.

of Foligno, Bernard de Gordon, Valescus of Tarranta, even Savonarola, speak in favor of derivative bleeding, and, in connection with the University of Montpellier, which was always under Arabic influences, the practice became common in France and was duly approved by the Paris Faculty. How powerful the Paris Faculty was in the sixteenth century, how it made surgeons and barber-surgeons crawl and knuckle under, how it called down curses upon heretic physicians which sounded like the anathemas and excommunications of religion, we all know. There is always a lingering suspicion that the general medical profession of these times needed stirring up with a pole, and they got it in some measure from Vesalius and the Greek scholars who poured into Europe, after the destruction of Constantinople in 1453, shortly after the invention of printing. These men, in the words of Knott, were literally "sowers of dragons' teeth," and the new ideas they introduced caused a great fermentation of medical heresies and the inevitable persecution of heretics. It is said that there are always three stages in the introduction of a new idea: First of all, people say, "It is not true"; second, "It is contrary to religion"; finally, "We knew it all before." And so it happened that in the year 1514, one Pierre Brissot, a learned physician of Paris, who was deeply read in the Hippocratic writings, came out in defense of the old Greek practice of bleeding on the same side as the lesion, because, from his own experience, revulsive bleeding did most good, since it removed the bad blood in a more

direct manner. Immediately upon this pronouncement a storm of controversy broke loose over Brissot's head. The Paris Faculty, as usual, declared him to be a medical heretic, revulsive bleeding was forbidden by act of Parliament, and three years later (1518) Brissot was induced to take a little journey into Spain and Portugal, ostensibly to study the strange and rare properties of medicinal herbs of the New World, but, in reality, because it was in his interest to come off with a whole skin. As in the case of Vesalius, Spain was a genial clime for heretics in those early years. The faculty of Salamanca declared in favor of Brissot, but in Paris the controversy raged fiercely long after his death in 1522, and even the Pope and the Emperor (Charles V) were dragged into it. Then came the anticlimax of this teapot tempest. A relative of the Emperor's, who had been bled by the Arabic method, during an attack of pleuropneumonia, suddenly died. Confusion reigned in the Arabic camp and the whole edifice of controversy collapsed like a puffball. The Brissot affair illustrates how purely theoretical was the practice of medicine in the sixteenth century, and for sheer absurdity might be paralleled by an occurrence in the seventeenth century which is related by that jovial historian of medicine, Johann Hermann Baas:—

“In Heidelberg, about the middle of the century, there arose at the bedside of the Margrave of Baden a difference of opinion between two learned professors and the ordinary physician—at all events

also a *medicus purus*—whether a plaster for the illustrious Margravian heart, in order to cover that organ, should be placed in the middle of the chest, according to Galen, or upon the left side. The dispute was settled by opening before the eyes of the noble patient—a hog—by means of which it was demonstrated that, as a matter of fact, the heart of the hog lay on the left side. This evidence so firmly convinced His Excellency that his own internal arrangements were quite the same as those of a hog, that he at once dismissed his private medical attendant for daring to hold a contrary opinion as to the position of a nobleman's heart."

After the fiasco of derivative bloodletting, many physicians gave up venesection altogether, but in Italy, under the leadership of Botallo, the practice was pushed to the extraordinary extent of bleeding in all diseases without exception, and that abundantly and many times in succession. For fully three centuries the Italians led the world, as it were, in extensive bloodletting. Costly bleeding glasses were hereditary in Italian families, and handed down as heirlooms.¹¹

A special feature of bloodletting in the northern countries during the fifteenth and sixteenth centuries was its connection with astrology and the fact that it had become so popular among the masses that it was done in the public baths; in other words,

¹¹ See the interesting essay, "The Old Venetian Bleeding Glass," by Dr. John Knott in *Medical Press and Circular*, xlvii, 662-664, London, 1889.

almost as often as a man took a bath. After the invention of printing a curious portion of the huge vernacular literature of the period consisted of the so-called bloodletting calendars and purgation calendars. In connection with these it is of interest to note that the first medical publication to be set in type was the Purgation Calendar (*Laxierkalender*) of 1457, printed by Gutenberg in the type of his 36-line Bible, and consisting of a single sheet of paper in the Bibliothèque nationale at Paris; the second in order of time being the Bloodletting Calendar (*Aderlasskalender*), printed at Mainz in 1462, and now contained in the Fürstenberg library at Donaueschingen in the Grand Duchy of Baden.¹² As in some of the drug-store almanacs within our own recollection, the writers of these calendars affected the scientific power of prediction in regard to wars, famines, epidemic diseases and other pests that were to befall mankind, and their efforts were specially characterized by the fact that the times for purgation and the innumerable points of election in bloodletting were determined by "judicial astrology"; that is, by horoscopes drawn from the ascendancies and conjunctions of the planets, under the signs of the Zodiac. In the sixteenth and seventeenth centuries, the doctor was too frequently an astrologer, and old Fracastorius declared men to be "slaves to the rabble of the sky."¹³ Doctor Urinal and Doctor Almanac were

¹² Sudhoff, *Archiv für Geschichte der Medizin*, 8, i, 223, 227, Leipsic, 1907.

¹³ Cited by Osler in *Proceedings of Charaka Club*, New York, ii, 15, 1906.

standard figures in the plays of the English dramatists of the Elizabethan and Jacobean periods; for example, in Middleton's *Inner Temple Masque*, which opens with "Doctor Almanac, coming from the funeral of December or the Old Year":—

I have seen the Old Year fairly buried;
Good gentleman he was, but towards his end
Full of diseases: he kept no good diet;

* * * * *

That was his fault, and many an old year smells on't.

The fifteenth century was, as stated, the great age of common public baths; the bath-keeper was usually a barber-surgeon and bloodletter, and toward the beginning of the sixteenth century these baths came to be frequented by both sexes at one and the same time. The contemporary pictures of the artists of the period reveal the astonishing spectacle of men and women, absolutely nude, huddled together in a huge common bath-vat or in a steaming bath-room, some playing upon musical instruments, some reading books, some guzzling wine, others eating a set meal from a temporary board arrangement not unlike that employed in Pullman cars, all soaking themselves at leisure and perspiring freely, while, as if to achieve the height of the ridiculous, a stream of blood spouts from the median basilic vein of some patron who is testing the bath-keeper's skill as a venesector. Public establishments of this kind were still common at Budapest in the first half of the nineteenth century,

and have been described in detail in the Hungarian travels of Richard Bright (of Bright's disease).

Harvey's quantitative demonstration of the circulation of the blood had no appreciable effect upon the practice of bloodletting, and it remained for Magendie to point out what should have been an immediate inference from Harvey's data, namely, that the so-called points of election in venesection are really indifferent points, since the effect of opening the different veins anywhere is exactly the same. Like many great experimenters, Harvey himself was only a passable practitioner and, in the treatment of disease, he and his contemporaries were completely overtopped and overshadowed by the great figure of Thomas Sydenham, who ennobled the practice of medicine through those personal qualities of piety, good humor, and common sense which Edmund Burke declared to be the genius of the English race. All agree that Sydenham resembles Hippocrates in his original descriptions of disease, and when he says that he holds himself answerable to God for the care of his patients, we recognize the same dignified regard for human suffering which characterized the Greek master. It was Sydenham who first threw open the windows and let the fresh air into the sickroom, introduced Peruvian bark and paregoric, prescribed cooling draughts for feverish patients, steel tonics for love-sick or green-sick maidens, riding in the open air for consumptives, and divested his prescriptions of all filthy and nauseating ingredients. In relation to venesection, Sydenham may be classed

among the extensive, as opposed to the intensive, bloodletters. In almost every disease known to him he began his treatment by opening a vein, but he seldom let more than eight to ten ounces of blood at a time, and, if this did not avail, he pushed the procedure no further. This was his practice in small-pox, erysipelas, gout, rheumatism, hysteria, chorea, insanity, dysentery, renal and biliary colic, hemoptysis, hematemesis and hematuria, leucorrhea, metrorrhagia, hemorrhoids, scurvy, epistaxis, convulsive cough in children, and in the condition known as "going into a decline." In rheumatism, gout, renal calculus, and intestinal obstruction blood was let from the arm of the affected side; in gonorrhea he directed that the blood should be drawn about once or twice when half-way through the treatment, as also in measles complicated with diarrhea or bronchitis. Venesection was interdicted by him in dropsy, diabetes, cholera morbus, and suppression of lochial discharges. The principal authority for Sydenham's practice is his little therapeutic manual (*Processus integri*) of 1691, which was the English physician's standby for over a century, and which a certain Oxford enthusiast of the day is said to have committed to memory. From the details just gleaned from this book it is evident that, in comparison with contemporary French practice, Sydenham's bloodletting was sensible, moderate, and temperate. It is said of Guy Patin, for instance, that he once bled a colleague thirty-two successive times for a continued fever and showed his own implicit faith in venesection

by bleeding himself seven times in succession for a simple cold in the head.¹⁴ The abuse of blood-letting by the seventeenth-century doctors was, in fact, a favorite theme for the satire of Molière and Le Sage, and the story of Doctor Sangrado, the "tall, withered, wan executioner of the sisters three," who reduced the old canon Sedillo "to death's door in less than two days" by drawing twelve good porringers of blood at the start, with repetitions, is a well-known chapter of *Gil Blas*. In the same novel, Le Sage gives an amusing instance of the use of another means of depletion, the seton or issue, an adjuvant of treatment which was first mentioned by the Salernitan surgeons, Roger and Roland, and was put upon a practical footing by the directions of Lanfranc. A little girl, Inesilla, after the communicative habit of the *enfant terrible*, betrays the secrets of the housekeeper's toilet to Gil Blas, which the valet-souled hero proceeds to give away as follows: "Dame Jacinta, as I have said before, though a little stricken in years, had still some bloom. To be sure, she spared no pains to cherish it: besides daily evacuations, she took plentiful doses of all-powerful jelly. She got her sleep in the night too, while I sat up with my master. But what perhaps contributed most to the freshness of this everlasting flower was an issue in each leg, of which I should never have known, but for that blab Inesilla."¹⁵

¹⁴ See Knott, *opere citato*.

¹⁵ Le Sage, *Gil Blas* (Smollett's translation).

In seventeenth-century Italy, bloodletting was as popular as ever and was the subject of elaborate copperplate illustration in the many books on the subject, of which Malfi's *Il Barbiere* (1618) may be taken as the type.

The eighteenth century has always been accounted the Golden Age, alike of the successful practitioner and the successful quack, and both found themselves confirmed and fortified in the practice of venesection by the ingenious arguments of the medical theorists who swarmed during this period. Boerhaave's doctrine of the plethora furnished an additional excuse for it, and Boerhaave was followed by Van Swieten and the old Vienna school. Stahl's theory (phlogiston) gave it the well-known antiphlogistic flavor. Reil favored it on physiological, Brown and Friedrich Hoffmann on mechanical grounds, for the relief of sthenic and asthenic, spasmodic and atonic conditions. Johann Peter Frank held that it promoted the resorption of settled exudates and regulated the excretions. Haller tried to justify or explain its *rationale* by experiment, but got no further than the statement that it hastens the blood-current. Percival Pott, Pringle, and the members of the Royal Academy of Surgery of Paris, bore a hard reputation as intensive blood-letters. Cullen and Théophile de Bordeu stand out as physicians who were very moderate in the practice. In the American colonies, Benjamin Rush, a follower of John Brown, was a veritable Sangrado of the New World, but the Anglo-Saxon practitioner of more conservative type was still a follower

of Sydenham. General Washington, however, lost his life from bloodletting. A well-worn epigram at the expense of John Coakley Lettsom, one of the illustrious line of English Quaker practitioners, noted for their ability, liberality of spirit, and their large charities, may still be quoted, although, like most epigrams, it was perpetrated at the expense of truth:—

When patients sick to me apply,
I purges, bleeds, and sweats 'em:
If after that they choose to die,
What's that to me? I. Lettsom.

The first half of the nineteenth century is especially interesting as marking the pro-wave of extensive and intensive bloodletting, while, at the same time, by the law of action and reaction, the general decline of the practice was brought about in a remarkable way. Many of the leading medical men of the time had passed through the Napoleonic wars and, in this rough school, had acquired a hard brutality, a supercilious indifference toward their patients which was sharply accentuated when it came to letting blood. This was particularly the case with François Joseph Victor Broussais (1772-1838), who had sworn at troops as a sergeant and had swung a cutlass as a privateersman during the Revolution with the same vigor with which he afterward wielded the lancet as an army surgeon in Napoleon's campaigns, Broussais, like John Brown, believed that life depends on external irritation, disease upon local irritation of some par-

ticular organ or viscus, usually the stomach and intestines. There was no healing power in Nature, and it was necessary to abort disease by drastic measures. He therefore initiated an antiphlogistic or weakening *régime* which consisted in depriving the patient of his proper food and leeching him all over his body. Even in cases of extreme debility, at least five to eight leeches were prescribed, while thirty to fifty applied together constituted his usual treatment. Under the Broussais *régime*, leeches became so scarce in France that, in the year 1833 alone, some 41,500,000 were imported, when less than ten years before 3,000,000 had been sufficient to supply all demands. Broussais was followed in this sanguinary practice by Bouillaud, who abused venesection by bleeding *coup sur coup*; by Dupuytren, and by Lisfranc. Of Lisfranc, Dr. Oliver Wendell Holmes, who was a medical student in Paris at this time, relates: "I can say little more of him than that he was a great drawer of blood and hewer of members. I remember his ordering a wholesale bleeding of his patients, right and left, whatever might be the matter with them, one morning when a phlebotomizing fit was on him. I recollect his regretting the splendid guardsmen of the old Empire,—for what! because they had such magnificent thighs to amputate."

In England and Germany things were not much better. The leading English medical journal of the day, founded in 1823, was called *The Lancet*. In Italy, Giovanni Rasori, at his clinic at Milan, became such another vampire for bloodletting as was

Botallo in the sixteenth century. Like John Brown, Rasori believed that the treatment of disease consists in stimulating depressed conditions and in depressing states of excitement, and that venesection was not only an arm of treatment, but a means of diagnosis, indicating an excited condition if beneficial or, if injurious, a state of depression. Acting upon these conventions, he either bled his patients to death's door or else practically poisoned them with gigantic doses of saltpeter (16 to 90 grams a day), gamboge (1 to 4 grams for diarrhea), aconite (134 grams in a week, death supervening), digitalis, opium, camphor, etc. Now the effect of all this pitiless bloodletting and drugging was exactly like what General Grant said about the strict enforcement of an obnoxious law. It eventually annihilated itself and in the most natural way, through the introduction of a new method of precision in medicine—medical statistics. Although the Romans and perhaps the Hebrews took the census and counted troops, while John Graunt, in the sixteenth century, studied the meaning of the birth and death rates, and Süßmilch, in the eighteenth, emphasized the moral significance of vital statistics, yet there were no true medical statistics before the time of Louis. Louis, like Laënnec, Bichat, and Pinel, was a man of finer mold and spirit than Broussais or Dupuytren, and touched to finer issues. Leading the austere life of a scientific enthusiast, divided about equally between the hospital wards and the post-mortem room, he was the first to make real medical statistics, in which the

separate items were not merely counted but of equal weights; and to emphasize the importance of what he did, it is 'worth while to quote at length from our principal authority upon French medical teaching at this time, Oliver Wendell Holmes:—

“You young men who are following the hospitals hardly know how much you are indebted to Louis. I say nothing of his *Researches on Phthisis* or his great work on typhoid fever. But I consider his modest and brief *Essay on Bleeding in Some Inflammatory Diseases*, based on cases carefully observed and numerically analyzed, one of the most important contributions to practical medicine, to the treatment of internal disease, of this century, if not since the days of Sydenham. The lancet was the magician's wand of the dark ages of medicine. The old physicians not only believed in its general efficacy as a wonder worker in disease, but they believed that each malady could be successfully attacked from some special part of the body—the strategic point which commanded the seat of the morbid affection. On a figure given in the curious old work of John de Ketam, no less than thirty-eight separate places are marked as the proper ones to bleed from in different diseases. Even Louis, who had not wholly given up venesection, used now and then to order that a patient suffering from headache should be bled in the foot, in preference to any other part. But what Louis did was this: He showed by a strict analysis of numerous cases that bleeding did not strangle—*jugulate* was the word

then used—acute diseases, more especially pneumonia. This was not a reform—it was a revolution. It was followed up in this country by the remarkable *Discourse upon Self-limited Diseases* of Dr. Jacob Bigelow, which has, I believe, done more than any other work or essay in our own language to rescue the practice of medicine from the slavery to the drugging system which was a part of the inheritance of the profession. Yes, I say, as I look back upon the long hours of the many days I spent in the wards and in the autopsy room of La Pitié, where Louis was one of the attending physicians—yes, Louis did a great work for practical medicine. Modest in the presence of nature, fearless in the face of authority, unwearying in the pursuit of truth, he was a man whom any student might be happy and proud to claim as his teacher and his friend.”

In Vienna, Skoda's therapeutic nihilism soon made short work of the “antiphlogistic” treatment of pneumonia by purging and venesection. In England, a vigorous assault was made upon the abuse of bloodletting by two well-known authorities, James Wardrop, the surgeon, and the physiologist, Marshall Hall; while the manly and straightforward Charles Reade lent his splendid talents to the ridicule of the practice and landed many a clever cross-counter, more especially in his enthralling story of *Hard Cash*. Charles Dickens has an amusing page on extensive leeching in *The Uncommercial Traveller*. Yet, in spite of all this marshalling of genius

and talent against it, bloodletting still held its own in England until well after the middle of the century, when, under the influence of Sir William Jenner and Sir William Gull, it was discarded about 1860. Most of us have or have had relatives who went to the old country doctor every spring to have their veins opened. Even in the latest edition of Sir Thomas Watson (1870) it is still extensively indicated, and the buffy coat in the drawn blood was always looked for as a sign of inflammation. To be bled was regarded as a sign of a vigorous constitution, and Sir Richard Burton relates that, after the cholera epidemic of 1831, Englishmen lamented the disuse of the daily Lady Webster pill as a sign of decadence. Yet general bloodletting did gradually and surely decline after the time of Louis, for even such a rational substitute as the so-called hemospasia of Junod, a method of producing a fainting spell by drawing blood from the brain to the foot, a species of bloodletting without letting blood, did not make any special impression, although the author asserted he had had most extraordinary success in many different diseases. The secondary reason for the gradual decline of bloodletting is probably to be found in the development of more refined methods of therapeutic procedure, such as the hypodermic needle, the many alkaloids introduced by Magendie, the coal-tar products of the German chemists, good dietetic schemes, beginning with the pioneer work of William Beaumont, massage, hydrotherapy, electrotherapy, and other devices which emphasize the principal modern ob-

jection to venesection, namely, its extremely disagreeable character, both for the doctor and the patient. The very subject of bloodletting is, in fact, a disagreeable one. In modern practice, it seems like the plausible villain in the play, neither entirely good nor entirely bad. Its true merits have been ably upheld by such authorities as Paget, Hughes Bennett, Sir William Broadbent, and Sir Andrew Clarke, and it would seem to be of special value in such indications as the sudden dyspnea, coma, and convulsions of uremic seizures or of puerperal eclampsia; the severe pain in pleurisy or pneumonia; threatened asphyxia from cardiac embarrassment, aneurism, or carbon-dioxide poisoning, and in cerebral hemorrhage, actual or threatened.

Haviland and Hall,¹⁶ in a recent study of the subject, sum up the modern indications for bloodletting as follows:—

“(1) Cases of an apoplectic nature, especially when associated with coma and cyanosis. (2) Cases of high tension and granular kidney in connection with arteriosclerosis. (3) Cases of convulsions in the status epilepticus. (4) Cases of uremia. (5) Cases of sunstroke with asphyxia. (6) Cases of polycythemia. (7) In hemoptysis, if there be engorgement of the right ventricle of the heart. (8) In aneurism for relief of pain. (9) In cases of dilatation of the right ventricle of the heart from whatever cause arising. (10) In cases of pneumonia, for relief of pain and dilatation of the right ventricle.”

¹⁶ *Westminster Hospital Report*, London, 1911, xvii, 1-21.

Pye-Smith states that its main indication is "cyanosis with distention of the right heart." In the ticklish matter of arterial hypertension, bloodletting is usually sneered out of court, on the ground that "it produced no appreciable fall of blood-pressure till the amount withdrawn by the circulation has become so great that life is directly endangered by the operation." On the other hand, Knott argues that, whatever inferences may be drawn from laboratory protocols, human beings are not necessarily rabbits, guinea-pigs, or dogs of a larger growth, since "the effect of a cut head or even a barked shin or scratched finger on the arterial tension in the human animal is often very pronounced indeed and requires neither kymograph nor sphygmograph to demonstrate it."¹⁷ The intense thirst and copious water drinking which follow depletion would seem to make the bloodletting of the past a vague equivalent of "bloodwashing," in the sense of removing poisons from the system.

The history of therapeutics illustrates Cardinal Newman's belief that mankind is influenced by types rather than arguments, and not so much by ideas and pure reason as by prevailing fashions. The world has witnessed the rise and fall of many a drug and has seen bloodletting die hard. In spite of its long descent, we know little of its reason for existence beyond the notion that it may relieve states of tension and plethora or remove peccant humors. Yet there is hardly a physician with a

¹⁷ See Knott, *opere citato*, p. 664.

good practice who may not suddenly encounter some circumstance in his experience in which venesection would turn out to be his sheet anchor and his patient's salvation. Even as the University of Minnesota has adopted the Renaissance idea of a botanic garden for teaching materia medica, or as experimental surgery is now taught upon animals at Yale and the Johns Hopkins Hospital, so it would be no bad plan if our medical schools used the Hindu method of inducting the student into the ancient practice of "breathing" a vein.

BLOOD AND LYMPH.

The *blood of the body* is spoken of as the medium for the reception and storing of the nutritive elements, after they have been properly prepared by the digestive organs, and for their conveyance to all parts of the body. The blood transports oxygen from the lungs to the tissues and carries off from the tissues the refuse matter to those organs whose function it is to separate them and eliminate them from the body. It is the source from whence the various tissues take their nutrition. The blood is said to be a digestive as well as a nutritive fluid, and the digestive processes taking place are regulated by a finely adjusted mechanism which at present we do not understand (Vaughan). The blood is the medium for transmission of certain internal secretions. It aids in maintaining the normal temperature and water contents of the body. The blood, histologically, is composed of an

almost colorless fluid, the *plasma*, in which float numerous microscopic masses of protoplasm, the *blood-corpuscles*. There are three general groups, or kinds, of corpuscles known, respectively, as the red, or *erythrocytes*; the white, or *leucocytes*; and the *blood-plates*.

The *normal reaction of the blood is alkaline*. This reaction is attributed to the sodium carbonate in solution in the plasma. The average *specific gravity* of the human blood in the adult male varies from 1.042 to 1.066. The average specific gravity, as taken, is about 1.055.

Hammerschlag's method of mixing chloroform (sp. gr., 1.526) and benzol (sp. gr., 0.889) in such proportions as to have a specific gravity of 1.055 is quite simple. A drop of blood is allowed to fall from the finger into the mixture. If the drop either rises or sinks, the chloroform, or benzol, is added to the point that the drop remains stationary, thus indicating its specific gravity.

The *quantity* of blood averages one-half to one-fourth of the total body weight.

The *red blood-corpuscles* in man are circular, biconcave disks without nuclei, from $7\ \mu$ to $8\ \mu$ in diameter, and about $2\ \mu$ in thickness. The average number is given as 5,000,000 per c.mm. for the adult male. The red color of the corpuscles is due to the presence of a red coloring matter known as *hemoglobin*.

The greater function of the red blood-corpuscles is to carry oxygen from the lungs to the tissues. This function is dependent upon the affinity of

hemoglobin for oxygen gas. The study of hemoglobin in the stroma of the corpuscles has been somewhat difficult, but it offers a prolific field for future investigation.

The *process of hemolysis*, or the discharging of hemoglobin from the corpuscles so that it becomes dissolved in the plasma, is caused by hemolytic agents. Some of the agents which produce hemolysis are as follows:—

Lowered osmotic pressure of the plasma; amyl alcohol; ether or chloroform; excess of alkali; saponin or sapotoxin; serum of blood of certain animals; bile or solution of bile salts; various toxins found in serum of other animals or among the natural hemolysins or by process of immunization.

The *nature and amount* of hemoglobin, its compounds with oxygen and other gases, derivative compounds of hemoglobin, variation in number of red blood-corpuscles, are subjects that should be studied closely and at length.

The *physiology of the blood-leucocytes, or colorless corpuscles*, has been the subject of numerous investigations, particularly in connection with morbid physiology. In the light of our present knowledge little positive information can be advanced as to the normal function of these cells in the body. The colorless corpuscles are not all the same histologically, and their functions are as diverse as their morphology. Formerly various classifications were made based upon differences in microscopic structure and reaction to staining agents, but at present Erlich's system is preferably

used. This classification divides the white corpuscles into two main groups,—the lymphocytes and the leucocytes,—and each of these into two or more subgroups.

The number of leucocytes, under normal conditions, average 5000 to 7000 per c.mm. The number may vary considerably the same day. They may be considerably increased (leucocytosis) by a meal, and diminished (leucopenia) again by fasting. Leucocytosis occurs under various other conditions, such as exercise, cold baths, pregnancy, menstruation, and epistaxis.

The *functions of the leucocytes* are quite interesting and remarkable for the part they play in the economy of the human body. The most striking property of the colorless cells is the power of spontaneously changing their shape,—ameboid movements. They are termed the “wandering” cells. This property of the white cells enables them to migrate through the walls of blood-capillaries into the surrounding tissue. Among the functions attributed by physiologists to leucocytes are the following: (1) They assist in protecting the body from pathogenic bacteria and other foreign organisms. (2) They aid in the absorption of fats and of peptones from the intestines. (3) They assist in the process of coagulation. (4) They are an important factor in the maintenance of normal composition of the blood-plasma in proteins.

The third variety of corpuscles known as *blood-plates* are small, circular, or elliptical bodies of nearly homogeneous structure, and vary in size

from 0.5 to 5.5 μ . They are smaller than the red cells.

Not so much is known of their origin, fate, and functions as in the case of the leucocytes. Wright claims there is a relationship between the blood-plates and the giant cells of the marrow (megakaryocytes), and ventures the opinion that the plates are detached pieces of the cytoplasm of the giant cells. Deetjen asserts that they are capable of ameboid movements, and that they possess a distinct nucleus.

Recent observers using special methods indicate the average number may be 500,000 per c.mm. Blood-plates take part in the formation of thrombi and in the initiation of coagulation.

There may be some question as to the reason for this brief discussion of the blood and lymph. Venesection is, at all times, an empiric agent unless done by one who has a thorough knowledge of general and morbid physiology. It is, therefore, positively imperative that one should be possessed of such learning before scientific venesection is attempted.

Venesection, in the normal adult, exercises a mechanical effect upon the circulation and a general effect upon the system. General bloodletting reduces amount of body blood, lowers blood-pressure, causes loss of red blood-cells, lowers specific gravity, causes leucocytosis, and diminishes activity of various functions. The heart is quieter, the respiration slower, tissue change less active, and the body heat is lowered. The depression is temporary, last-

ing from a few minutes to a few hours, depending upon the amount withdrawn. Then there is renewal of blood, with hyperleucocytosis; tissue change is accelerated, and the nervous system is improved by stimulation of the nerve-centers. Robin claims that after moderate bleeding of 150 to 250 grams there is polyuria and increase in the excretion of solids, and that a greater amount of air is taken in with increased consumption of oxygen by the tissues.

HEMATOLOGY.

Hematology is of intrinsic value in medical and surgical practice. If one would be a successful phlebotomist, he must have a thorough working knowledge of the general physiology and pathology of the blood. It is, therefore, fitting that hematology be here briefly discussed. As to the specific diagnosis of a given disease, the results of a blood examination are often misleading; yet this clinical evidence is a part of a system that aids in positive diagnosis.

The detection of the characteristic leucocyte formula in leukemia and of the recognizable megaloblastic cell changes in pernicious anemia are signs of a positive diagnosis. The leucocyte count, hemoglobin values, coagulation time, bacteremia, iodophilia, and cryoscopy are applicable to every-day practice.

The salient principles of blood histology and pathology will be briefly referred to as essential hints to a more extensive reading of hematology.

The *blood is alkaline in reaction* and usually remains so as long as the emunctories act normally. In severe anemias and cachexias, in uremia, diabetes mellitus, cholemia, in many of the dermatoses, in Asiatic cholera, and after chloroform narcosis, decreased alkalinity is commonly found. The *specific gravity* is temporarily increased by cyanosis, pyrexia, fasting, diarrhea, emesis, sweating,—factors which tend to inspissate the blood. It is decreased by dilution, as after injection of normal salt solution, anemia, or following the ingestion of a large volume of liquid.

The fluid constituent of the blood, *the plasma*, contains about 10 per cent. of solids, chiefly proteids. *Sodium chloride* is the principal salt of the blood, and others appear in the form of sulphates, and the salts of magnesium, calcium, and potassium. The *gases* of the blood are oxygen, carbon dioxide, and nitrogen. Some of the *extractives* of the blood are sugar, cholesterin, creatin, xanthin, fats, and urea.

Extravascular coagulation is due to the interaction of fibrinogen and a calcium salt. *Hematopexis*, or the coagulation time of the blood, normally takes place within from three to six minutes. The coagulation time is *delayed* in anemia, jaundice, anasarca, hemophilia, asphyxia, acute alcoholic poisoning, and other toxic conditions. Hematopexis is *accelerated* by the administration of small doses of calcium salts and thyroid extract.

Hyperinosis, or an increase in the amount and density of fibrin network, occurs in pleural effusion,

croupous pneumonia, abscess, rheumatic fever, peritonitis, variola, erysipelas, and influenza.

Hypinosis is a term used to denote a deficiency in the quantity of fibrin. It frequently occurs in primary anemias, malignant disease, tuberculosis, malaria, purpura, and enteric fever.

The process of estimating the *freezing point* of liquids, and applied to the blood and urine, is termed *cryoscopy*. It is used with the object of determining the molecular concentration. The freezing point of blood rises in nephritis, pneumonia, uremia, cyanosis, hemoglobinemia, and high-grade anemias.

All causes of vascular embarrassment, as hepatic and cardiovascular diseases, and abdominal neoplasms should be excluded before basing a diagnosis upon the findings of the cryoscope.

Hemoglobin occurs in the stroma of the red cells as oxyhemoglobin, and is derived chiefly from the iron ingested from the food. The normal percentage of hemoglobin is arbitrarily fixed at 100. The term *color index* means the proportionate amount of hemoglobin in each erythrocyte, the normal standard, calculated by dividing the hemoglobin percentage by that of the erythrocytes, being 1 (Da Costa).

The subjects, oligochromemia, hemoglobinemia, methemoglobinemia, carbon-monoxide hemoglobin, and the anemias should be studied closely.

Alterations in blood-volume are of practical interest in the interpretation of the blood report, and in venesection.

Lipemia is a term used to denote an excess of fat in the blood. Physiologically, it occurs during digestion, in obesity, in pregnancy, and in menstrual suppression. Pathologically, it is present in diabetes mellitus, gout, acute fevers, and arteriosclerosis.

Glycemia means an excessive accumulation of sugar in the blood. It occurs in acute infections, diabetes, and carcinoma.

Bacteremia is a term used to denote the presence of a certain organism in the blood, as the bacillus of Eberth, pneumococcus, etc.

A knowledge of the pathologic structural changes of the erythrocytes is quite necessary to a thoroughly systematized blood work. A great deal of the present discussion, however, will be based upon leucocytosis:—

Leucocytosis is the term applied to an increase, above normal, in the number of leucocytes in the peripheral blood. This increase marks a relative gain of polynuclear neutrophiles. Leucocytosis means not simply the total number of cells, but also the variety—an *ordinary leucocytosis*, in which the polymorphonuclear cells are increased in number, and *lymphocytosis*, in which the lymphocytes are decreased in number, and is called *leucopenia*. A blood count that shows 40,000 leucocytes per millimeter may mean a leucocytosis or a leukemia, but if 90 per cent. of this increase are polynuclear neutrophiles, there is undoubtedly a leucocytosis.

Hyperleucocytosis may be physiologic or pathologic. *Physiologic* leucocytosis occurs under condi-

tions that must be regarded as normal. The concentration of the blood and peripheral stasis of moderate degree and short duration are physiologic changes when not due to stimulation of the hematopoietic organs. Hyperleucocytosis occurs in the newborn, digestion, pregnancy, post-partum state, exercise, massage, baths, and agonal.

Pathologic leucocytosis takes place under positive abnormal conditions. These abnormal states may be infections, inflammatory and toxic, causing an overproduction of cells by the bone-marrow in order to protect the organism against the attacks of the disease. It is said that hyperleucocytosis is preceded by a brief hypoleucocytosis due to the initial shock of the irritant.

Da Costa finds that in disease the action of the leucocytes is an index to the intensity of the pathologic irritant as well as to the individual resisting power.

Pathologic hyperleucocytosis may be classified as follows: (1) posthemorrhagic hyperleucocytosis; (2) hyperleucocytosis of infection and inflammation; (3) hyperleucocytosis of intoxication; (4) hyperleucocytosis of malignant disease; (5) experimental leucocytosis; (6) hyperleucocytosis of leukemia and marasmus.

The leucocytosis of inflammation and infection has been graphically described and classified by Da Costa.

The following table serves to illustrate the leucocyte range in relation to the intensity of the irritant and the reaction offered by the individual:—

Degree of leucocytosis.	Intensity of irritant.	Resisting powers.
Marked,	Marked,	Normal,
Slight,	Moderate,	Normal,
Slight,	Moderate,	Indifferent,
Absent,	Marked,	Feeble,
Absent.	Feeble	Normal.

The most important factors of true inflammatory and infectious leucocytosis are tabulated herewith:—

I. GENERAL INFECTIONS.

Asiatic cholera,	Malignant jaundice,	Spotted fever,
Bubonic plague,	Pneumonia,	Tetanus,
Cerebrospinal fever,	Relapsing fever,	Trichiniasis,
Diphtheria,	Rheumatic fever,	Typhus fever,
Dysentery,	Scarlet fever,	Vaccinia,
Filariasis,	Secondary syphilis,	Varicella,
Glanders,	Septicemia & pyemia,	Variola.

II. LOCAL LESIONS.

Acute nephritis,	Arthritis,	Cholangitis,
Actinomycosis,	Bronchitis,	Cholecystitis,
Appendicitis,	Burns,	Dermatitis,
Endocarditis,	Hydatid disease,	Pancreatitis,
Enteritis,	Infected wounds,	Pericarditis,
Erysipelas,	Mastitis,	Peritonitis,
Gangrene,	Meningitis,	Purulent lesions,
Gastritis,	Multiple neuritis,	Splenitis.
Hanot's cirrhosis,	Osteomyelitis,	

Within a short time after acute *well-marked hemorrhage* the number of leucocytes is greatly increased, and this lasts for several days. In fatal cases this increase may not be noted. An ordinary

traumatic hemorrhage, venesection, and post-partum hemorrhage are exciting causes of this variety of leucocytosis. Stengel asserts that the lymphocytes are markedly increased. In chronic hemorrhages, as in gastric cancer or ulcer, hemoptysis, phthisis, bleeding hemorrhoids, and oozing uterine fibroids, leucocytosis is rarely noticeable.

The leucocytosis of intoxication, which occurs in poisoning from illuminating gas, etherization, quinine, phosphorus, ptomaines, snake-venom, in uremia, cholemia, chloroform narcosis, is explained by the theories applied to infectious leucocytosis.

The leucocytosis of malignant diseases, such as carcinoma and sarcoma, is due, no doubt, to the toxic material liberated in the lymphatic system.

The hyperleucocytosis, accompanying marasmus and leukemia, is most likely due to a derangement of the hematopoietic system.

Experimental and therapeutic leucocytosis is comparatively a new subject and will be the source of much knowledge, not alone as to hyperleucocytosis, but with regard to the chromaffin system.

Hypoleucocytosis, or leucopenia, indicates a decrease below normal of the white cells in the peripheral blood. Löwit asserts that this is due to *leucolysis*.

The hypoleucocytosis of infectious diseases is very important. It is found in measles, paratyphoid, influenza, malarial fever, tuberculosis, enteric fever, and trypanosomiasis. Leucopenia may be induced experimentally by chemic and organic substances.

Metchnikoff, in his writings on immunity, traces the history of the theory of phagocytosis, and states that one of the practical applications is the induction of artificial leucocytosis to combat the invasion of bacteria. McDonald has found that injections of nucleinate of soda produce a considerable leucocytosis without other undesirable effects. He asserts that in cases where infections are inevitable this artificial leucocytosis seems to be efficient in enabling the system to combat the infection. He gives, as an illustration, a young girl suffering from rupture of the intestines after volvulus. The comparatively uneventful course of the case seemed to be due to hyperleucocytosis, which had been artificially induced before operation. The procedure was found successful in other cases. He gives the injection of nucleinate of soda twelve hours before the operation, thus inducing a leucocytosis a few hours after operation, when its presence is most needed.

The secret of life of the human body lies hidden within the borders of its component cells. In order that life and action be maintained, all cells must work in harmony. The white blood-cells, undoubtedly, play the most important rôle in the economy of the human organism.

The phagocytic theory of Metchnikoff, Erlich's side-chain theory in immunity, and the various investigations of Wright mark the beginning of a new epoch in medicine and surgery.

The experiments of Vaughan, later confirmed by Kossel, support the theory that bacteria contain no

cellulose and are particulate, unshielding proteins, and consequently are more nearly related to the low forms of the animal kingdom.

It has been proven that most bacteria produce specific proteolytic ferments. The action of bacterial proteoses is delayed by quinine, antipyrin, and other antifebrile agents. The bacterial proteose is not capable of digesting living protein (Vaughan). Pfeiffer first demonstrated that normal leucocytes have a digestive action. Jochmann asserts that leucocytic proteose is supplied from the neutrophile cells. In resorption from wounds, in cleaning abscesses, and in local infections, leucocytic proteose plays the principal rôle. The appearance of foreign proteins in the body is the signal for the leucocytes to begin their attack. Some bacteria are destroyed by intracellular digestion, others by a ferment due to the disintegration of the leucocytes.

Müller holds that resolution in pneumonia is due to the activity of the leucocytic proteose. According to Bittorf, autodigestion of the leucocytes leads to the production of ammonia, amino-acids, and nuclein bases. The identity of the bactericidal and the proteolytic constituents of blood-serum or leucocytic extract is a much mooted question and has received the attention of eminent investigators.

The production of active proteolytic ferment and antibodies from the leucocytes in the blood is a factor of great import in experimental medicine. Vaughan says that man is immune to most bacteria not because they do not elaborate poisons in the tissues of the body, but because they are destroyed

by the proteolytic enzymes before they have time to multiply.

The observations of Joblin and Bull and others show that in the infectious diseases the invading organisms are digested, and among the digestive products there is one or more highly active poisons.

The study of the relation of the parenteral protein digestion to immunity and disease has done much to improve our understanding of the phenomena of infection. There seems to be a very promising field for advance in medicine and surgery, along some of the most difficult lines of procedure, in the expedient which has for its basis theories of phagocytosis, now so generally accepted as the foundation of immunity and the source of resistance to bacterial invasion, and the neutralization of bacterial and chemic toxins.

PATHOLOGIC ANTHROPOLOGY.

The subject of anthropology has not been extensively applied to the study of medicine and surgery; yet it is very important and should be considered in every-day practice. The value of animal experimentation cannot be denied, but the best knowledge of the diseases of man is acquired by the study of man. Every man is a cosmos within circumscribed limits, no two created exactly alike, and should be so studied from the cradle to the grave.

Experience also teaches that one pupil may be adapted to one kind of exercise and another to

another kind. "Accordingly, a really physiologic system of gymnastics requires that those movements and those exercises which are least easily performed should be practised, according to special methods, until they have strengthened the less developed functions, without causing illness or producing harmful reactions" (De Giovanni).

The final results are an improvement in the morphologic proportions of the organism, and are consequently a correction and improvement in the relative liability to disease.

The other fundamental pathologic type described by De Giovanni is the *hypersthenic* (second morphologic combination), corresponding in part to the *sanguine* temperment of Greek medicine, and in part to the *bilious* temperment. In this type the total spread of the arms is generally less than the stature, and the perimeter of the chest notably exceeds one-half the stature. Consequently we are dealing with the *brachyscelous* type.

This type has a greatly developed thorax, a *large heart*, an excessive development of the intestines; hence he is a hearty eater, subject to an overabundance of blood; he is overnourished; the ruddy skin reveals an abundant circulation; there is an excess of adipose tissue and a good development of the striped muscles. Such a constitution accompanies an *excitable, impulsive, violent disposition*, and conduces to diseases of the heart. "This type is characterized in general by robustness and a liability to disorders of the central circulatory system" (De Giovanni).

But there are still other forms of disease that await the individuals of this class, such, for example, as disorders affecting the interchange of organic matter (diabetes, gout; polysarcia) and attacks of apoplectic nature. In the case of acute illness individuals of this class suffer from excess of blood and may be relieved by being bled. They are readily liable to bloody excretions (Montessori).

INDICATIONS FOR VENESECTION.

Venesection is to be governed, in part, by (*a*) the intensity of the toxin in the circulation, (*b*) the number of leucocytes, (*c*) condition of the emunctories, (*d*) condition of the heart and arterial system, (*e*) the chromaffin system, (*f*) body weight.

When the emunctories are functioning properly, and the leucocytes are maintaining a constructive metamorphosis, venesection is not indicated. If there are toxic or bacteremic properties in excess, inhibited leucocytic action, and emunctories functioning, small (200 c.c.) venesection is indicated. Intense toxemia, poor elimination, increased leucocytosis, medium (500 c.c.) is necessary. Poor elimination, intense toxemia, normal or hyponormal leucocyte count, large (1000 c.c.) withdrawal of blood is imperative. Medium and large withdrawals of blood must be followed by transfusion of normal saline or isotonic solution equal to the amount of the blood withdrawn. It is the best procedure to give intravenous injection in opposite arm simultaneously with the venesection.

Venesection is governed by indications much the same as any other therapeutic agent. Repeated bloodletting, when indicated, is stimulating and salutary. To use the words of Da Costa: "Venesection diminishes blood-pressure, increases speed of the blood-current, thus amends stasis, absorbs exudates, and washes adherent corpuscles from the vessel-wall; it decreases amount of fibrin and albumin, lowers temperature and arrests cell proliferation, and stops effusion," and in so doing produces a result that no other therapeutic agent can.

When venesection is followed by a normal saline or other isotonic solution, we have a most excellent adjunct in the treatment of many diseases. In acute nephritis, eclampsia, and various toxic conditions of the blood, most authorities agree as to the effect of venesection, but not as to the effect of drugs.

The hematopoietic system, emunctories, and lymphatic circulation, are influenced in proportion to the intensity of the toxemia. Slight toxic condition of the blood will interfere with their functions; moderate toxemia will cause a partial paralysis, and intense toxemia may cause partial or complete paralysis and cessation of function. It is not unusual to have congestion of the liver, kidneys, spleen, and even the lungs and pancreas, in typhoid, eclampsia, lobar pneumonia, and puerperal septicemia.

The natural sequence of such a condition is an increase in the production of toxic material in the blood. This will continue until relieved by a therapeutic agent or death interferes.

Venesection removes toxic material from the blood in direct ratio to the amount of blood withdrawn. The bloodletting first affects the blood-pressure. If the blood-pressure is hypernormal, due to the irritant producing vasoconstriction, the blood-pressure is reduced, and if hyponormal, due to the irritant producing a partial paralysis of vasomotor centers and ensuing vasodilatation, venesection tends to bring about a normal blood-pressure. The irritant or toxic factor removed, the hematopoietic system is stimulated. New blood is carried into the circulation. The lymphatic system takes on renewed activity. The congestion of the emunctories is relieved. The heart and arterial system regain their equilibrium. The chromaffin and nervous systems are stimulated, thus bringing about a balance of functions.

THE TECHNIQUE OF VENESECTION.

Introduction.—The peculiar medical cultures of the ancients—Egyptians, Babylonians, Jews, Persians, Chinese, and Aztecs—have been buffeted upon the stormy billows down through the centuries until there is hardly a vestige that remains. Thousands of scholars have been gathered to the dust from which they sprung without leaving a heritage of medical lore. Hundreds mark the pages of history here and there through the last four thousand years who have aided in the promotion of future knowledge.

When we review the works since the time of

Hippocrates, we marvel at how little service has been rendered to the main object of medicine, the cure of disease; for, above all, in internal medicine, which enjoys the most extensive field of activity, we are, in most part, sadly disappointed.

The history of medicine plainly sets forth the inadequacy of medical knowledge, and in many cases the absolute nullity of medical skill in the struggle with the laws of all-powerful nature. Medical art from time immemorial has struggled continually for the prevention, the cure, or at least the alleviation of the woe and suffering imposed as an unavoidable heritage, and in a thousand different forms, upon the human family.

We come now to a department of our theme which cannot fail to elicit the most profound interest and earnest consideration of every thoughtful student of medical culture who has followed with patience the development of the subject to this point,—ancient Egypt, the home of magnificence and mystery.

Egypt is undoubtedly one of the oldest of civilized lands. The extreme antiquity of Egyptian civilization, from which many of the most ancient nations (including the Greeks) borrowed a part of their science and their culture, is evidenced by records and dynastic registers which are extant.

More than ten thousand years before the dawning of the Christian era, Egypt was entering upon the period of its intellectual and spiritual ascendancy. About this time those schooled in the art of medicine, ever watchful for a propitious oppor-

tunity to convey their message of scientific knowledge to the world, believed that the hour had indeed come. Their teachers in council assembled, after the most thoughtful consideration and candid deliberation, decided to undertake the establishment of a branch school near the center of Egyptian civilization. To that end Athotis, one of the teachers, was commissioned to direct this difficult undertaking. Under his personal supervision the work was undertaken and inaugurated. A school was established. Under the ancient safeguards of secrecy and the protecting shield of obscurity its work was conducted in accordance with the laws of the parent school. For more than four thousand years its influence was a potent factor in the upbuilding of Egyptian civilization. Evidences of their art and science were wrought upon enduring monuments which, even to this day, mark the upward pathway of Egyptian civilization and bear silent but eloquent testimony to the wisdom and work of this school of physicians.

It is not unreasonable to believe that Mesu (Moses), the great teacher and leader, was educated in this school. Arabians, Greeks, and many other nations borrowed much of their knowledge from the Egyptians.

The tide of Egyptian civilization reached its height. The material prosperity of a nation or a people, when it rises to a certain point, seems to develop a subtle poison whose cumulative effects will, in due time, manifest themselves physiologically within the body politic. First comes the spirit

of selfishness, then the desire for power, then struggle for place, then struggle for wealth, then the practice of dishonesty, the oppression and suppression of the weak, then the protest of the injured, then the internecine strife, then the final struggle for existence, and in the end spiritual darkness and national death.

Egypt died of her own poison, Greece perished by her own hand, and the great Roman empire was destroyed by her own cancerous disease. A smattering of their arts and sciences has come down to the present as relics of those crumbled ruins of past civilizations.

The ancient Egyptians were no less successful than we in the treatment of internal diseases. The Greeks and Arabians of that time were well versed in finer arts of diagnostics. Cleopatra (B.C. 69-30) prescribed arsenic, elaterium, charcoal, lathyrus, and sulphur for various diseases. Theophrastus of Eresus, in Lesbos (B.C. 372-285), prescribed mercury in different affections with success. Nicander of Colophan (B.C. 136), in Lydia, writes of the treatment of the bites of serpents by leeches, cups, and cautery. He mentions the removal of poisons by emetics, and the envelopment by drinks of milk, oil, wine, etc. Physicians of Pharaoh's time practised venesection and cupping. Praxagoras of Cos (about B.C. 335) favored bleeding before the fifth day in inflammations. Venesection and cupping, especially the former, were used by the ancient Indians as a means for exciting and strengthening the desires and delights of love in both feeble and strong—a genuine oriental specialty.

Hippocrates II of Cos (B.C. 460-377)—the greatest and most famous physician of all antiquity, a man endowed with the most unique gifts for his profession—advised venesection after dining or drinking, and in warm weather instead of cold. He selected the inner vein of the arm. His pupils practised first on the veins of plants, until they were proficient, before they were permitted to operate upon the human body. The most common accident was phlebitis. Hippocrates recognized the importance of the viscosity and specific gravity of the blood (afterward confirmed by Celsus), for he bled as long as the blood was “thick and dark” and stopped when the blood appeared “red and clear.”

Celsus (B.C. 25 to A.D. 45) regarded bleeding as the principal means of extracting morbid material from the blood.

Aretæus the Cappadocian (A.D. 30-90) recommended venesection in epilepsy, pleurisy, vertigo, etc. He advised venesection from frontal vein in headaches, epilepsy, vertigo, and hemicrania; veins of tongue in throat affections; nasal veins in hemoptysis and headache; scarification of the pubes or venesection of the ankle in hysteria, etc.

Ambroise Paré advised bleeding from the straight vein of the forehead for pain in the back of the head.

Galen (A.D. 131-210) was among the first to introduce the quantitative idea. He recommended the withdrawal of 7 ounces to 1½ pounds, according to the gravity of the disease.

From the time of Galen the art of medicine gradually declined until most all medical and surgical procedure was in the hands of the barber-surgeon, bath-keepers, sow-gelders, and the strolling "incisors." Thus by prostitution the art of venesection lost its scientific aspect and efficiency through incompetency.

It is not unwise to say that the discussion of the scientific application of venesection brought about a revolution in the practical branches of medicine in the sixteenth century. Pierre Brissot, of Fontenay-le-Comte in Poitou (1478-1522), who practised in Paris, came out in the defense of bleeding on the same side as the lesion (revulsive) and was declared a medical heretic by the Paris Faculty. The results of this doctrine bore fruit and at the end of the century Brissot was recognized as a reformer almost as great as Theophrastus von Hohenheim.

Sydenham (1624-1689), of England, the most distinguished practitioner of his time, was a scholar of the Hippocratic type. His additions to diagnostics, pathology, and therapeutics were classic contributions of that period.

Benjamin Rush (1745-1813), of Philadelphia, a pioneer of American medicine, was a leader in medicine, and a prominent figure in the Revolutionary War. The favorite remedies of Dr. Rush were "venesection and calomel," both of which he employed freely and with apparent recklessness. There is no doubt that Dr. Rush went to extremes in his application of venesection.

It is argued at the present time that venesection is not indicated, as most infectious diseases are self-limiting, and, again, that "venesection is such a disagreeable practice." Then one author will tell you that George Washington lost his life from venesection; another will say that S. Weir Mitchell's life was saved by timely bloodletting. It is said, "By authorities you may prove anything." For instance, in the book of Holy Writ it says: "And Judas went out and hanged himself." In another place it says: "Go thou and do likewise."

The therapeutic agents, mercury, sulphur, arsenic, elaterium, cinchona, opium, venesection, cupping, massage, hydrotherapy, and cauterization, have come down to us from antiquity.

I can say, without fear of contradiction, that outside the ancient remedies, until within the last twenty-five years, internal medication had made no progress in two thousand years.

This failure on the part of the medical profession has caused dissension and unbelief. Thus, a soil enriched by the slothfulness of the profession has yielded a rich harvest of pathies, isms, and systems of healing without number.

Although mercury, arsenic, sulphur, and cinchona are among our oldest drugs in the armamentarium of most every practitioner of medicine, how many physicians can, at first hand, give the physiologic action of these drugs? I am skeptical, and say "very few." Such being the case, I will say, with all kindness and charity for every practitioner of medicine, or writer of textbooks, Do not con-



The points marked — represent the locations at which venesection or transfusion may be performed. The points marked ⊙,, ..., \, ., ., /, represent the locations at which wet-cupping, leeching, or scarification may be performed.

demn a remedy or method for the alleviation and cure of disease until you have duly and truly prepared yourself and given it strict trial and due examination.

Where and How Performed.—The operation of venesection may be performed upon the median basilic, median cephalic, external jugular, internal saphenous where it rests on the tibia above the malleolus, vein from mastoid foramen, frontal vein, occipital vein, anterior auricular vein, middle temporal vein, nasal vein, and vein under the tongue, according to the result to be obtained. If the veins are obscured in the region of the injury or disease, leeches may be used to start the flow and then cups or a vacuum pump used to abstract the desired amount.

In general bloodletting, the median cephalic, median basilic, external jugular, or the internal saphenous may be selected. The median cephalic is the most common selection, and is preferred to the median basilic because of the proximity of the brachial artery, which, if injured, may give rise to arteriovenous aneurism. The flow is slower from the median cephalic and enables the operator to get a better gauge of the pulse. Care should be taken to avoid division of the branches of the cutaneous nerve, as it may give rise to traumatic neuralgia (Tillaux).

The field of operation is washed thoroughly with soap and water, benzin applied and allowed to dry, and then tincture of iodine applied.

Should the median basilic or median cephalic be

selected, a bandage is tied around the arm above the elbow, just tight enough to prevent venous flow above and make the veins stand out prominently below. If the factor of blood-pressure is to be considered, the arm band of the sphygmomanometer can be used instead of the bandage.

The patient is instructed to grasp some object, as the back of a chair, or clutch the hand tightly. If the patient is frightened or nervous, a local anesthetic may be used. All operations are not performed with the patient in the upright position. In plethoric individuals the upright or sitting posture is adhered to; in septic cases the recumbent position; in asthenic cases, where blood is withdrawn and saline infusion given, the lower part of the body is somewhat elevated above the shoulders.

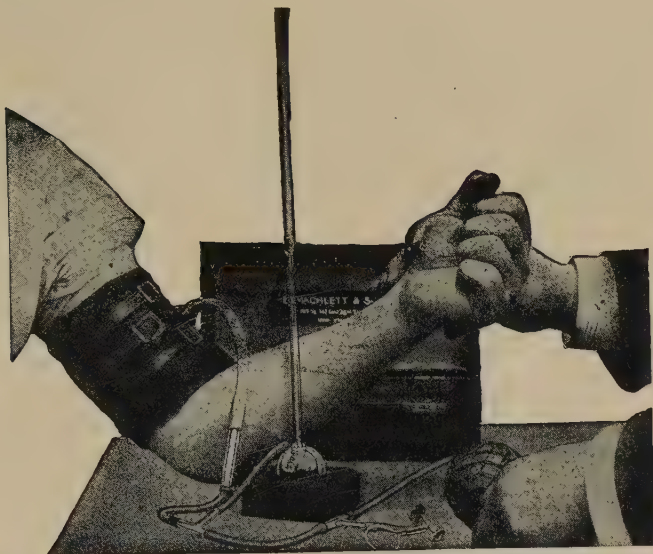
The operator stands with the back to the patient, rests the patient's arm against his side and steadies it, grasping the wrist with the hand. In this manner the patient's arm is, so to speak, in a vice. It is expedient for the untrained operator, instead of holding the wrist, to steady the vein to be incised with the thumb and index-finger, so that his incision will be accurate. The vein is transfixed obliquely with the bistoury (cutting edge up), so as to include one-half to two-thirds of the diameter. The blood is allowed to flow into a basin held underneath the arm. If the flow is retarded the incision may be held open and the veins massaged from below upward. When sufficient blood has been withdrawn, the incision should be carefully cleansed, an aseptic gauze pad applied, the bandage



The points marked $\text{—}\cdot\text{—}$, \dots , \odot , represent the locations where scarification, leeching, or wet-cupping may be performed.

removed, and a spiral reverse bandage applied from the fingers to the shoulder.

The following apparatus, instruments, and material are necessary for the operator in venesection:—



Riva-Rocci-Cooke sphygmomanometer.



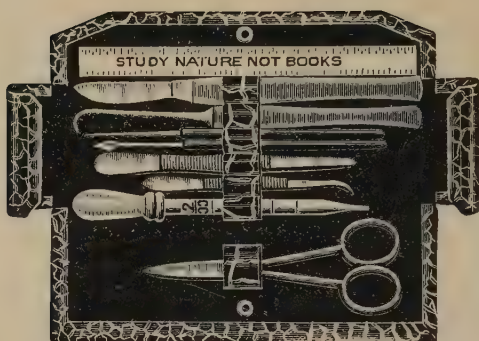
Scarificator.



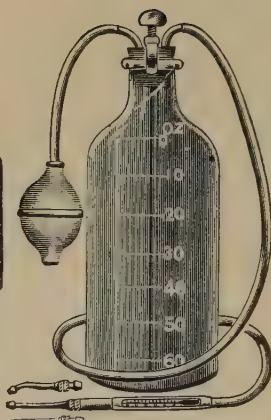
Cupping outfit.



Heurteloup's artificial leech.



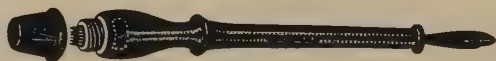
Instruments.



Fowler's infusion apparatus.



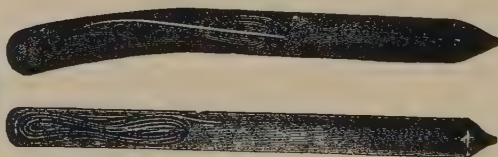
Spring lancet.



Lebenswecker-Baumschied.



Roller bandage.



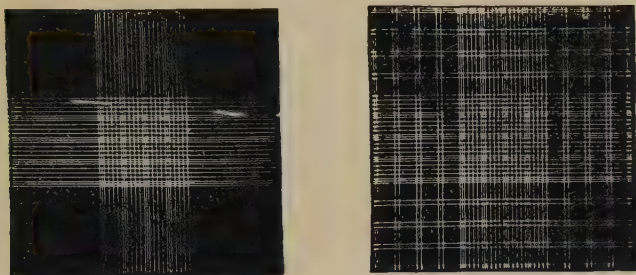
Catgut half-curved needle.



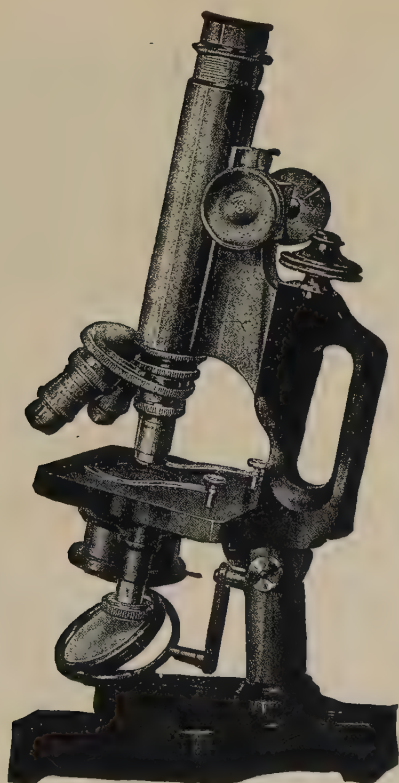
Microscopic blood trocar.



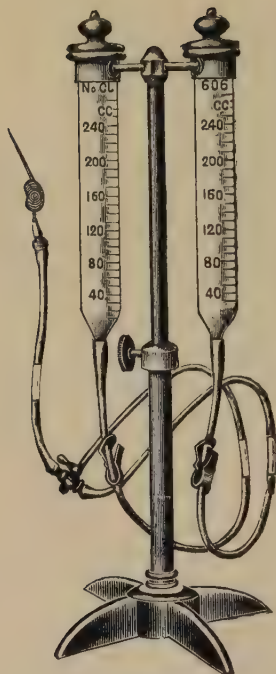
Wash-basin.



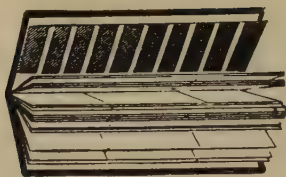
Hemacytometers.



Microscope.



Infusion apparatus.



Tallquist hemoglobin scale.

Thoma ruled counting chamber
(hæmacytometer).

ALCOHOLISM.

Alcoholism is an intoxication established by the excessive use of alcohol. Impaired health, unstable mental power, heredity, the intemperate use of alcoholic beverages, and unfavorable moral, social, and personal influences are predisposing causes.

The acute alcoholic condition requires little consideration beyond the prevention of the continued use of alcohol, elimination, stimulation, and moral persuasion.

The chronic use of alcohol is a disease of peculiar proportions. The inebriate who "saturates his blood and tissues every day for years is much more apt to suffer from chronic alcoholic poisoning with its attendant degenerations than one who goes on a 'spree' once a month for a day or two, and during the intervals is free from the toxic influence of alcohol." Such being the case in its many phases, alcoholism is a difficult disease to treat. Alcohol should be gradually withdrawn, patient isolated (preferably in a hospital for inebriates), and given nutritious, liquid food. Free action of the skin, kidneys, and bowels should be secured. This cannot always be done, and a condition of dementia, delirium tremens, and coma ensues. The emunctories fail to respond to internal medication and the usual therapeutic measures. The administration of drugs, very often, seem to intensify the toxic condition.

The most logical procedure is to (*a*) relieve the engorged tissues, (*b*) reduce the mass of toxic blood, and dilute the blood with some fluid which will facilitate cellular nutrition and activity; then (*c*) administration of indicated remedies.

This is best illustrated by a case reported by me some years ago:—

CASE 90.—D. D., male, aged 30; bartender; had diseases of childhood, typhoid fever, and syphilis; came under my service April 5, 1905. Patient had been on a debauch for four weeks. There was inability to retain food, insomnia, tremor, intense

excitement, soon followed by the illusions and hallucinations characteristic of delirium tremens. The bowels were evacuated by warm saline enemata. Morphine, gr. $\frac{1}{4}$, and atropine, gr. $\frac{1}{100}$, were administered hypodermically every three hours for twenty-four hours, without any effect. Chloral hydrate was given in the following combination:—

Chloral hydrate	20 gr.;
Potassium bromide	15 gr.;
Ext. Indian cannabis,	
Ext. hyoscyamus	āā $\frac{1}{8}$ gr.

The above mixture was given every two hours for twenty-four hours without any perceptible effect. The pulse was 95, full and bounding. Eighteen ounces of blood were withdrawn, repeated in six hours, and an intravenous infusion of normal saline solution of sixteen ounces, to which was added one-half teaspoonful of ammonium chloride solution, was used.

The chloral hydrate was then administered in 15-gr. doses every two hours for three doses, and the patient passed into a quiet sleep which lasted ten hours. The following day 20 grains of trional were given and hot liquid diet administered by mouth. Strychnine nitrate, gr. $\frac{1}{30}$, and atropine sulphate, gr. $\frac{1}{100}$ every four hours. April 15, the patient was able to resume work.

AMENORRHEA.

Amenorrhœa is the absence of menstruation. It may be due to a variety of causes.

The patient sometimes suffers from attacks of headache, dizziness, and flushes, recurring at intervals corresponding generally to the expected menstrual periods. In such cases as these the discomfort can often be relieved by scarifying the cervix until a few ounces of blood have been removed. W. L. Burrage has successfully treated cases of this kind by the application of leeches to the cervix (Kelly).

Montgomery calls attention to the fact that the general abstraction of blood is rarely practised. He is cognizant of the fact that in many cases a good bleeding would cut short a severe illness or abort an inflammatory attack. The local abstraction of blood by the use of the scarifier or by puncturing the cervix will often be effective in relieving the pain of engorgement and in promoting absorption and resolution of inflammatory conditions.

In cases of superinvolution or atrophy of the uterus, treatment may be followed by favorable results if the cavity of the organ does not measure less than two inches and molimen is present. Scarification of the cervix is of benefit in these cases, and increases the flow of blood to the pelvic organs. It should be performed twice a week for an indefinite length of time, and also when the molimen is present (Ashton).

ANEURISM.

An aneurism is a dilated or ruptured artery forming a pulsating blood-tumor.

The object of treatment in aneurism is to lessen the blood-pressure, so as to diminish the growth of the tumor and favor coagulation of the blood, by which the cavity may be eliminated. Aconite is used to relieve pain and slow the circulation. Calcium chloride, zinc chloride, ergotin, and some other drugs tend to favor coagulation. Chloroform relieves dyspnea; morphine with croton chloral for pain.

A. Robin prescribes a milk and vegetable diet; also rest and repose for the patient. If the subject is syphilitic, he begins with the following mixture:

℞ Corrosive sublimate gr. iij;
 Potassium iodide,
 Distilled water āā ʒv;
 Syrup of viola tricolor ʒv;
 Simple syrup ʒvj.
 M. et Sig.: One teaspoonful twice daily before meals.

If the patient is not affected by syphilis, the following is prescribed:—

℞ Potassium iodide ʒiiss;
 Extract of opium gr. vj;
 Chloral hydrate ʒj;
 Distilled water ʒix.
 M. et Sig.: One teaspoonful twice daily before meals.

Inject every week deep into the tissues of the buttocks, taking proper antiseptic precautions, 10 drams of the following solution, and increase the dose each week by 5 drams until about 3 ounces are taken:—

℞ Gelatin ʒss;
 Sodium chloride gr. xxj;
 Sterilized water ʒvj ʒij.
 Make a solution, and sterilize at temperature of 248° F.

In *hemoptysis* the following is prescribed:—

℞ Calcium chloride ʒj;
 Syrup of opium (*Pharmacopée Française*) ʒj;
 Cinnamon water ʒiv.

M. et Sig.: One tablespoonful every one or two hours as needed.

The cough may be alleviated by the following pill:—

℞ Extract of opium gr. iij;
 Extract of stramonium gr. ¾.

Sig.: One pill every three or four hours.

To overcome any dyspnea, give 10 drops of a 50 per cent. solution of oxycamphor in alcohol, on sugar, three or four times daily; or draw off, by leeches or venesection, about twelve ounces of blood. To lower arterial tension, Robin gives, according to the height of the pressure, 2, 3, 4, and up to 10 drops of 1 per cent. solution of nitroglycerin in a tablespoonful of water. Break a pearl of the nitrite of amyl in a handkerchief and hold it near the patient's face.

Forchheimer says that in thoracic aneurism bleeding sometimes gives relief. Pressure on the veins causing engorgement, particularly of the head and arms, is sometimes promptly relieved by free venesection, and at any time during the course of

a thoracic aneurism, if attacks of dyspnea with lividity supervene, bleeding may be resorted to with great benefit. It has the advantage also of promptly checking the pain, for which symptom, as already mentioned, the iodide of potassium often gives relief (Osler).

The *abstraction of blood*, by leeches or venesection, is a valuable method, giving great relief when there is much venous turgescence or when attacks of dyspnea are distressing features in a case. It is scarcely necessary nowadays to inculcate caution in the use of this therapeutic method; indeed, it is probably too infrequently adopted as a means of relief (Sanson).

ANGINA PECTORIS.

Angina pectoris is a term applied to a group of symptoms associated with cardiovascular disease.

The etiologic factors in the disease are: syphilis, arteriosclerosis, excesses in eating, drinking, smoking, mental and physical labor, and heredity. It is said that women are rarely attacked. Jews are particularly prone to the disease.

Syphilitic cases require active treatment—salvarsan in the subject under 40, mercury and iodide of potassium in older persons (Osler). The attack should be relieved by inhalations of nitrite of amyl (Brunton). Morphine sulphate, gr. $\frac{1}{4}$ to $\frac{1}{2}$, and atropine, gr. $\frac{1}{100}$, should be given at once to relieve the pain. Nitroglycerin, gr. $\frac{1}{100}$, may be given hypodermically. Balfour urges the use of

chloroform as a helpful agent. Nitrites of sodium and potassium are less rapid than amyl in their action, but have more power to prevent the return of the symptoms. In angina of mental strain, Marchiafava advocates theobromine gr. xv three times a day. Lauder Brunton says, "In the case of angina pectoris, in which I used nitrite of amyl for the first time, small bleedings of three or four ounces were the only thing which eased the pain before the nitrite was employed, and even after its employment bleeding from the arm benefited the patient. In engorged conditions of the right side of the heart, whether due to mitral incompetence or pulmonary affections, bloodletting not only relieves the symptoms, but may save the patient's life.

APOPLEXY.

Apoplexy is a term used to denote hemorrhage into the cerebral tissue, causing pressure and more or less destruction of function of the brain-substance; characterized by sudden unconsciousness; noisy, irregular respiration, and muscular relaxation.

Any condition or disease that produces degeneration in the arterial walls, as gout, rheumatism, syphilis, alcoholism, Bright's disease, errors in diet, is a predisposing cause. A sudden rise in blood-pressure is the usual exciting cause. It rarely occurs under 40 years of age, unless due to syphilis or mineral poison.

Apoplexy may be long postponed, or entirely prevented, by attention to atheroma and by avoid-

ing all emotions, overeating, alcohol, meats, tobacco, and other causes of cerebral hyperemia. The treatment of the apoplectic attack depends on the condition present. The indiscriminate bleeder does as much harm as the timid one who never uses the lancet.

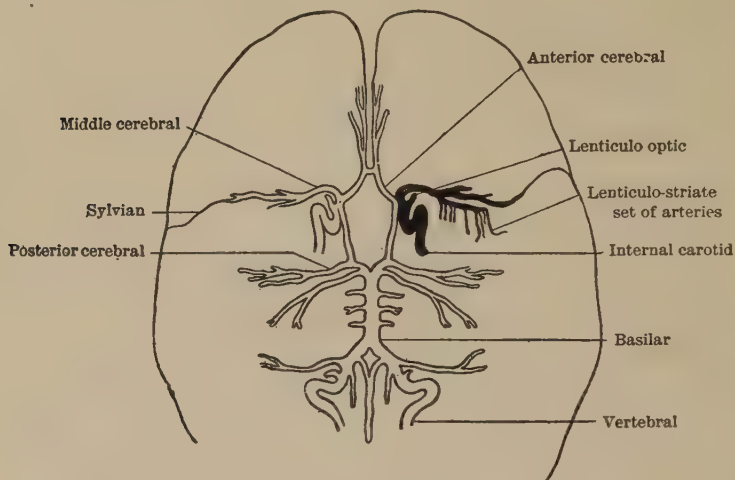
Goldscheider lays great stress on the necessity for leaving the patient where he is, not attempting to remove him. If he has to be taken elsewhere, the transportation must be done with extreme gentleness, and the distance reduced to minimum. He should never be allowed to travel, even in the mildest cases. The clothing should be removed as if the patient had been severely wounded—cut off, if necessary. The aim is to keep him absolutely quiet; he must not make any movement or speak, but be placed with the chest and head raised, in a quiet, cool room. No one should be allowed to tempt him to speak or induce emotional excitement. An ice-bag should be placed to the affected side of the head in case the face is congested and hot. In case of difficulty in respiration during coma the mouth and throat should be wiped out repeatedly and the head bent forward a little to keep the tongue from falling back, or the jaw and tongue may have to be drawn forward.

It has been my practice to bleed as soon as possible after reaching the side of the patient. If it is indicated by the blood-pressure, repeat the venesection.

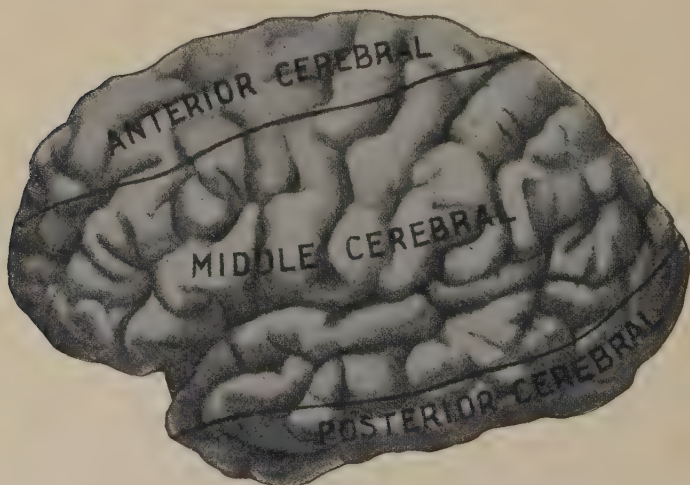
Oppenheim recommends lying on the side. In case the patient vomits, he must be quietly and

cautiously turned on the side and the vomited masses wiped away to keep the air-passages free, supporting the head the while. The nurse in such cases must be well trained, and if the patient is a very heavy man a strong male nurse is preferable. No means are known by which vomiting can be prevented in these circumstances. Mustard to the neck and moist heat to the epigastric region or the calves seem to hasten consciousness. Venesection generally produces a transient improvement, and in exceptional cases the improvement may be permanent. The theoretical objections against venesection are not sustained in practice. Still better results might follow if it were done earlier. He advocates it when the cerebral hemorrhage is diagnosed beyond question, and the congestion in the head with full, bounding pulse persists while the comatose condition continues unmodified or is growing worse. Small, weak, rapid pulse and pallor contraindicate venesection. He withdraws from 200 to 300 c.c. of blood from the arm on the unparalyzed side. Collapse, insomnia, headache, convulsions, should be treated symptomatically, not shrinking from narcotics. Nothnagel's rule is to bleed when respiratory paralysis is threatened by cerebral hyperemia. The typical case for bleeding presents a languid face, distended veins, pulsating carotids, powerful heart action, tense pulse (normal or above it), heart slow and regular, respiration uniform (quiet and snoring), the patient strong and not too old. Rapid pulse and Cheyne-Stokes respiration call for bleeding. In other cases it does harm.

The drawings below diagram in a mechanical way arteries of the brain most liable to be affected in cerebral hemorrhage:—



Arteries at the base of the brain. One of the lenticulo-striate set is called the "artery of cerebral hemorrhage."
(Slightly modified from Dercum.)



Portions of the cerebral hemispheres supplied by the anterior, middle, and posterior cerebral arteries. (Redrawn from Dana.)

Waugh says the first indication following the return of consciousness is to moderate the fever. This requires rest and quiet, in a cool, dark room, low diet, and aconitine or veratrine; the bowels moderately relaxed and the kidneys acting. Retention of the urine should be guarded against. When the fever has subsided the resorption of the clot and infiltration are to be promoted. Diuretics should be first employed, followed by mercury or the iodides. No definite directions can be given, as all depends on the conditions present.

It has been my custom to bleed at once should prodromal symptoms be in evidence; 200 to 1000 c.c. may be taken, as indicated, without untoward effects. This should be followed by saline laxative, aided by an enema. Aconitine may be given to reduce blood-pressure. Leeches to the mastoid and potassium bromide, gr. xl, or fluidextract of ergot, fʒj, may be substituted if the patient is weak. For the attack, elevate the head and turn to one side, loosen the clothing, ice-bag to the head, venesection, a mustard foot-bath, and oleum tigllii, ℥ij, placed on back of tongue, followed later by water.

The amount of blood withdrawn is governed by the weight, age, circulation, and general condition. If there is hypertension of the arteries or fever when consciousness is regained, aconite or veratrum viride is indicated.

To cause absorption of the effused blood, potassium iodide, gr. v, *t. i. d.*, gradually increased to physiologic effect, alternated with:—

℞ Liq. potassii arsenit. ℥v;
 Syr. calcii lactophosph. fʒij.

After two months a weak galvanic or autocondensation current, massage, and baths may be used.

The diagram illustrated below is self-explanatory in that it makes plain the fact that blood withdrawn from the veins at points indicated on the head and face in the photographs will relieve congestion of the cerebral vessels:—

The patient should be placed on his back, with the head high, the neck free, kept absolutely quiet, and measures taken to reduce the arterial pressure. Of these the most rapid and satisfactory is venesection, which should be practised whenever the arterial tension is much increased. With a small pulse of a low tension and signs of cardiac weakness it is contraindicated. The chief difficulty is in determining whether the apoplexy is really due to hemorrhage, or to thrombosis or embolism, since in the latter group of cases bleeding probably does harm. As a rule, however, in middle-aged men with arteriosclerosis, an accentuated aortic second sound, and hypertrophy of the left ventricle, bleeding is indicated.

The treatment of softening from thrombosis or embolism is very unsatisfactory. Venesection is not indicated, as it lowers the tension and rather promotes clotting (Osler).

Indirectly the cerebral circulation is affected by reducing the quantity of blood in the general circulation by bloodletting. When the patient is seen

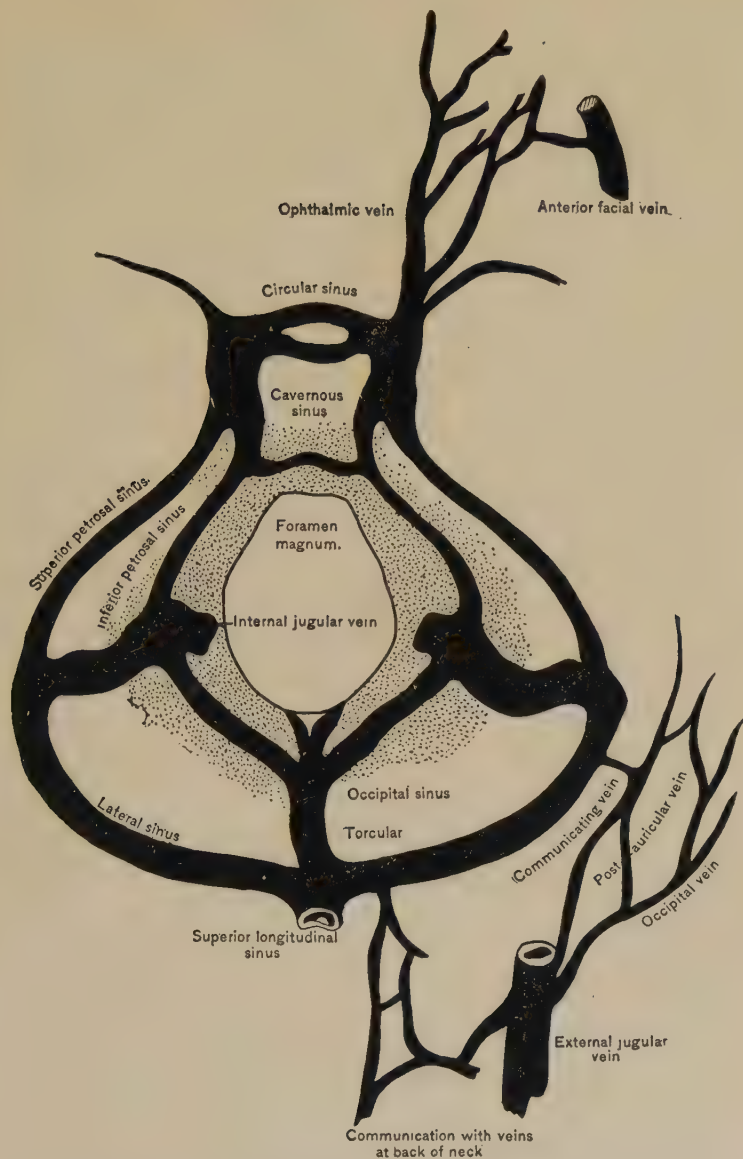


Diagram showing the communications (indicated in the figure by black dots) between the lateral and cavernous sinuses and the external veins. (Redrawn from Leube.)

in the beginning of the attack, the diagnosis being positive, venesection may be performed, from five to sixteen ounces of blood being withdrawn, as the pulse warrants. The contraindication is found in cases where the blood-pressure is not high, and in weakened or anemic subjects. In some cases venesection seems to be followed by great improvement, sometimes very temporary; in the massive hemorrhages I have rarely found it of service (Forchheimer).

ARTERIOSCLEROSIS.

Osler defines arteriosclerosis as a condition of thickening of the arterial coats, with degeneration, diffuse or circumscribed. The process leads, in the larger arteries, to what is known as atheroma and to endarteritis deformans, and seriously interferes with the normal function of various organs.

Josué presents a list of early signs of arteriosclerosis which allow its differentiation in its incipency, while there is still a prospect of arresting its progress by appropriate measures. The symptoms are the result of slight and variable disturbances in the local circulation. The arteries are less elastic, contracting less readily, and the course of the blood is not normally regulated. In some cases these symptoms appear only after effort. There may be general disturbances; the patient tires more easily, and is weary and depressed, with intolerance occasionally of alcohol and tobacco. Vasomotor, nervous, respiratory, ocular or auditory disturbances are also common, with epistaxis, edema, arte-

rial hypertension or heart and kidney symptoms. Among the nervous troubles may be lessened aptitude for physical and mental work, disinclination to commence a new task, transient loss of memory or a slight transient difficulty in speech. The patients sometimes display unusual irritability or somnolency.

Headache is a frequent early sign, especially morning heaviness and oppression in the head, becoming actual headache in the course of the day, sometimes pulsating. The pain is generally located high on both sides. The pain sometimes comes on or is aggravated by mental or physical effort or ingestion of alcohol. The mere fact of concentrating the attention is sometimes enough to arouse pain. He calls this symptom "the sign of painful thought." Continuous headache persisting after correction of refraction errors is probably due to atheroma or arteriosclerosis. The patients sometimes complain also of a transient tingling or heaviness in the arms or legs. Intense or persisting neuralgia is not infrequent, intercostal, trigeminal or in the legs, but the pain does not follow the course of the nerves, and there are occasional intermissions. Sometimes the pain alternates with tingling or itching in the limbs; it is not modified by pressure, and there are no other sensory disturbances in the regions involved. Vertigo is one of the warning symptoms of arteriosclerosis. Sometimes the patient feels dizzy when he stands up after reclining, or there may be a vague impression that the floor is not solid. Sometimes he feels

as if something were moving in his brain. All other affections that might induce vertigo must of course be excluded. The patient generally finds it impossible to go to sleep, and after tossing restlessly for hours sleeps tardily and briefly, his slumber being restless and interrupted by sub-delirium.

When neurasthenia is observed in a previously healthy person between 45 and 50 years old, and no other cause can be assigned for it, incipient arteriosclerosis should be suspected. This tardy neurasthenia frequently accompanies cancer, tuberculosis, diabetes, and incipient general paralysis, as well as incipient arteriosclerosis. The neurasthenia is generally of a mild form, and the arteriosclerotic lesions are more functional than organic in the early stage. Another early sign of arteriosclerosis is the exceptionally slow return to normal after a traumatism.

Spasmodic phenomena in the arteries of the retina are also among the signs of incipient arteriosclerosis, as also thrombosis of the central artery, atrophy of the macula and central scotoma or circumscribed atrophy of the optic nerve. Slight dyspnea on effort is an important sign, as also spasmodic severe dyspnea, which generally follows error in diet. As a rule, such patients have emphysema.

Epistaxis is another important early sign; it is best not to check it unless the hemorrhage is excessive, as it is a valuable safety-valve for high arterial tension. Slight edema of the legs, especially toward evening, is another sign. The blood-

pressure is not always high during the early stages of arteriosclerosis, but when it is, and the high pressure persists, arteriosclerosis and atheroma should be surmised, especially when combined with some of the other signs mentioned above. The presence of kidney disease does not testify against arteriosclerosis, and it may even be the cause of the latter. In one of Josué's cases a young woman had a mild kidney involvement during an attack of scarlet fever. There was a slight albuminuria, a little edema of the eyelids, and a gallop rhythm. These symptoms lasted only a week, but the radial arteries soon became hard to the touch and could be rolled under the finger. There was no other sign of atheroma, but it was unquestionable that the changes in the kidney had left their impress on the arterial system.

Oliver sums up his observations with the following conclusions as to the etiologic factors of arteriosclerosis:—

1. It is misleading to attempt to refer arteriosclerosis to any one cause in all cases.

2. The causes are, as a rule, multiple, though a certain cause, or more than one cause, may be predominant in individual cases.

3. The leading causes are: (*a*) persistent super-normal arterial pressure, however induced, and (*b*) toxins of various kinds, either generated within the body (endogenetic) or introduced from without (exogenetic).

4. In addition to these determining causes there

are certain predisposing factors, such as heredity and trophic proclivities.

The first step in the treatment is to ascertain the exact condition of the blood, kidneys, metabolism and nervous constitution, including the mentality. Symptoms must be corrected by drugs which are antagonistic to them and by diet, exercise, and environment. The patient must be under treatment long enough for the correction of the underlying cause and the completion of a physiologic re-education which may overcome the high-tension habit (Bishop).

Hasebroek assumes that the peripheral vessels play an active part in the circulation, and describes the principles by which arteriosclerotics are able to obtain pronounced benefit from apparatus gymnastics. He aims to insure ample exercise without increasing the blood-pressure. In an experience of seventeen years in a Zander institution he has never witnessed any mishaps from the exercises, even in cases of severe anatomic sclerosis of the aorta and coronaries, the patients always feeling better after the exercises. Climbing stairs is more dangerous for arteriosclerotics than even the Zander movements. By daily stimulation of the peripheral circulation with these individualized exercises, the functions of the body in general are promoted and waste matters eliminated better.

Imperfect circulation and imperfect respiration tend to produce the products of waste, and we must look to the elimination of these by the means

of purgatives such as calomel and compound jalap powder. Half a dram to a dram of compound jalap powder every morning, or every other morning, is a most useful agent in withdrawing water and waste matter from the body, and thus aiding the action of the kidneys. Its efficacy is increased by administering to every dose the following:—

Spirit of juniper ℥xxx;
 Potassium tartrate gr. xx;
 Decoction of broom-tops q. s. ad ℥j.

Or,

Pulveris digitalis,
 Pulveris scillæ,
 Massa hydrargyri,
 Extractum hyoscyami āā gr. j.

A great deal of attention should be given to the diet in all diseases of the heart and arterial system. A highly nitrogenous diet is absolutely injurious. The proteids should be kept as low as they possibly can be consistently with the proper performance of the bodily functions. The use of salines, cascara, aloes, rhubarb, along with each meal, stimulates the action of the stomach and bowels.

In cases which come under observation for the first time with dyspnea, slight lividity, and signs of cardiac insufficiency venesection is indicated. In some instances, with very high tension, striking relief is afforded by the abstraction of twenty ounces of blood (Osler).

Sanson emphasizes the fact that cardiac tonics are powerless for good when the right ventricle is overdistended or when its every systole forces a considerable back wave into the venous system. After a bleeding of six or eight ounces from the arm the distention may be relieved and the cardiac tonics, which were powerless before, then become effectual. I have seen many cases in which the lesson of the value of venesection in these cases has been taught. One such abstraction of blood often relieves, but it is usually necessary to repeat the operation after the lapse of a few days.

In discussing the therapeutics of sclerotic condition of the vessels Lauder Brunton says that the steady employment of iodides is sometimes most useful, and that he has found great advantage in a number of cases of high tension from 20 grains of nitrite of potash along with $\frac{1}{2}$ to 2 grains of nitrite of sodium given in a tumbler of water or aperient water every morning on rising. This seems to keep the tension from rising too high, and the treatment may be continued for years.

Where this is insufficient, it may be supplemented by 2 or 3 grains of sodium nitrite in water every four hours, or by nitroerythrol in doses of $\frac{1}{2}$ to 2 grains, or $\frac{1}{100}$ grain nitroglycerin in tablets or solution. Ammonium hippurate, as recommended by Oliver, may be useful.

In very high tension it may be advisable to bleed from the arm. The effect of this in relieving angina was most strikingly shown in the patient whom I afterward was able to relieve by the use of nitrite of amyl.

ASPHYXIA.

Asphyxia is a condition in which there is a suspension of all signs of life. It is due to the arrest of respiration from a deficiency of oxygen in the blood.

The most common causes are the inhalation of natural, coal, or carbon-monoxide gas. Chloroform, ether, and other gases may cause failure of respiration.

Artificial respiration and physical measures should be adopted at once. It is imperative that 500 to 800 c.c. of blood be immediately withdrawn. After the venesection 1000 c.c. of one of the following physiologic solutions should be given intravenously:—

LOCKE'S SOLUTION.

Sodium chloride	0.900
Potassium chloride	0.025
Calcium chloride	0.023
Sodium bicarbonate	0.020
Glucose	0.100
Water	98.932

100.000

ADLER'S SOLUTION.

Sodium chloride	0.5900
Potassium chloride	0.0400
Calcium chloride	0.0400
Magnesium chloride	0.0250
Sodium phosphate (NaH_2PO_4)	0.0126
Sodium bicarbonate	0.3510
Glucose	0.1500
Distilled water	98.7914

100.0000

In carbon-monoxide intoxications, in which the tissues are insufficiently supplied with oxygen in consequence of the formation of carbon-monoxide hemoglobin, also in intoxications with agents which form methemoglobin, oxygen therapy, both in the form of inhalations and by rectal administration, is advisable and theoretically well founded (von Neusser).

BERIBERI.

A disorder of metabolism associated with the defect of certain unknown elements of the food, and characterized clinically by multiple neuritis, anasarca, and muscular atrophy (Osler).

The etiology is unknown, but is thought to be due either to an acute infection or to a disorder of metabolism.

The incubation period of the disease is unknown. The following forms are recognized: (*a*) rudimentary form; (*b*) atrophic form; (*c*) wet or dropsical form; and (*d*) acute, pernicious, or cardiac form.

The disease often sets in with catarrhal symptoms; paresthesia, first in the legs, then in other parts of the body; affections of the heart, atrophy of muscles, dyspnea, and dropsy. Any set of these symptoms may grow rapidly worse till death ensues. Mortality varies from 2 to 50 per cent.

The treatment consists of nutritious diet, rest in bed, purgation for dropsy, cardiac stimulants, and salicylates for the neuritis. Massage, passive

movements, and electricity, may be used for atrophic muscles when edema has subsided.

Bloodletting has a well-recognized field in the treatment of beriberi, either to prevent or relieve the cardiac paroxysms. Scheube believes this treatment was first used by Marshall, and has lately been recommended by Anderson and Bälz.

Sodré states that the beneficial and almost miraculous effects of bloodletting in those cases in which death is imminent have led some physicians to apply it systematically in all cases of beriberi. This practice is not to be commended and can only lead to disastrous results. Bälz draws from 300 to 400 c.c. of blood. Miura advises against putting off abstracting blood too long, but to undertake it before cardiac action has sunk too low and while the impulses of the heart's beat can still be felt. He reports excellent results from drawing 100 to 250 c.c. of blood in two or three sittings by means of cupping glasses or leeches.

BLOOD-PRESSURE IN THE PRACTICE OF MEDICINE.

Blood-pressure is the force exerted by the blood upon the cardiovascular walls. This pressure may be supernormal, normal, or subnormal. Any aberration of blood-pressure produces a pathologic condition. Therefore, it will be necessary, in taking up this subject, to consider the various phenomena peculiar to this condition. Dr. Ludolf Krehl, of

Strasburg, has made the following observations: "Stimulation of the peripheral nerves will normally cause reflex arterial contraction and rise of blood-pressure. Nervous impulses from the heart are able to affect the size of the blood-vessels and in a measure regulate the work of that organ. The degree of contraction is dependent on the impulses they receive. As the arteries leading to certain parts of the body dilate and contract, the blood-supply to that part is altered." These observations are confirmed by some authorities and denied by others; so it leaves one to investigate for himself.

The study of blood-pressure in lower animals has been very unsatisfactory because of the low scale of the organism. Experiments on normal man have produced some good results, but the only reliable study of blood-pressure disease is the disease itself.

The pathology of abnormal blood-pressure will be dealt with summarily. Blood-pressure may be, primarily, the etiologic factor, or, secondarily, the sequence of pathologic conditions. When blood-pressure is the causative agent, it produces at first a hyperemia of the capillaries and arterioles, and causes a leakage into surrounding tissue. Long-continued congestion of the capillaries results in capillary dilatation, capillary ectasis, or capillary aneurism, as shown in passive congestion of the lungs. Hyaline degeneration may be observed in the brain, kidneys, lymph-glands, or tumors. Fatty changes in capillary epithelium occur frequently in various conditions. Hemorrhage may result from

diapedesis or rhexis. These conditions also play a part in thrombosis and embolism. Calcareous infiltration occurs frequently, as observed in arteriosclerosis and its sequelæ. The calcareous infiltration may be preceded by amyloid degeneration, as found in the capillaries of the spleen, liver, kidneys, and in general amyloidosis. The heart and arteries follow in various degenerations. These changes are fully discussed in ordinary textbooks on pathologic anatomy, and I need not dwell on them here.

The etiologic factors are: (1) mechanical; (2) reflex; (3) central—in reference to the central nervous system.

Mechanical factors, such as inelasticity of the arteries, increased amount of blood, capillary congestion, impeded venous circulation, forcible action of the heart, muscular exertion, increased atmospheric pressure, cause increased peripheral resistance or supernormal pressure. A softening or fatty condition of the arteries, diminished force or action of the heart, decreased amount of blood, and decreased atmospheric pressure produce subnormal pressure.

Reflex causes, such as stimuli direct to the vessel-wall or heart-wall and contained ganglia, produce at once a supernormal or subnormal pressure. The irritant may be adrenalin, nicotine, alcohol, lead, the nitrites, aconite, digitalis, or caffeine. Chemical and biologic irritants are found in gout, chlorosis (von Noorden), autotoxemia, fevers, Bright's disease, and syphilis. Intense heat, elec-

tricity, and vibration are among other causes that may be classed reflex.

Central causes, or those due to influence on the central nervous system, such as worry, grief, joy, fear, produce at once vasoconstriction, or dilatation. "Stimulation of the central nervous system will stimulate vasomotor centers and thus produce contraction of the splanchnic vessels and great rise of blood-pressure" (Krehl). "Continuous high pressure may accompany renal disease, arteriosclerosis of the aorta or of the splanchnic vessels" (Krehl).

The symptoms of aberrated blood-pressure are varied and complex. They simulate symptoms of other diseases and may partake of or complicate other diseases. The brain, because of its large blood-supply, is generally the part first affected by the abnormal pressure and gives rise to headache, vertigo, syncopal attacks, disorders of vision and hearing, blunted intellect, irritable temper, and perhaps hallucinations or acute mania. The face and eyes may be red and congested, and the carotid pulsating. The sleep is disturbed by dreams and cramps in the limbs. The patient has usually no complaints unless he is attacked suddenly by a sensation of falling and may stagger, if standing, and sink unconscious and completely relaxed to the ground.

The next to be affected, and perhaps the next to come to notice, is the heart. Uneasiness and precordial discomfort are ordinarily the first symptoms. Palpitation or pain is seldom complained of except when there is much increased demand on

the heart. The general symptoms are: flushing of face, headache, carotid pulsation, and tinnitus aurium. In the early stages of high blood-pressure, the first and second sounds of the heart may be metallic and accentuated. In the early stages of atheroma, the cardiac impulse is forcible and the second sound accentuated. The patient may be walking along the street, when he feels a peculiar heavy throb in the chest which is accompanied by a momentary sensation of choking or smothering. He feels everything give way under him, loses control of limbs, staggers, and by chance falls, at other times recovers before losing his balance. This is a condition which I shall call *artery-block*, producing temporary or transient stoppage of the heart. This block, caused by spasm of capillaries, arterioles, arteries, and probably the heart, may be so forcible as to cause paralysis, rupture, or valvular lesion of the heart.

Following closely, or simultaneously, the kidneys, liver, and lymphatics are affected. When these organs are affected the blood-pressure is, at all times, abnormal unless regulated by treatment. The lungs are generally the last to be affected, except in tuberculosis, bronchial asthma, or cardiac asthma (Hare).

Diagnosis may be determined early by the characteristic variations of pressure. I have found in my own cases, using the Riva-Rocci sphygmomanometer, or the Cooke modification, that the physiologic variation of blood-pressure is, when lying at rest:—

For children of 1 to 5 years	80 to 98 mm.
For children over 5 years	98 to 112 mm.
For adult women	110 to 130 mm.
For adult men	120 to 140 mm.

I have used the sphygmograph a great deal for experimental purposes, but find it inconvenient for practical use, on account of the delicate mechanism. Otherwise the diagnosis is made only by close study of symptoms and sequelæ.

The prognosis is invariably good if the abnormal pressure is recognized early, and when not produced by degeneration of heart or vessels, or the presence of unconvertible substance in the blood. When aberrated pressure is associated with degenerative processes, the prognosis is fair, provided a compensatory metabolism exists or can be produced. In degeneration and non-compensatory conditions the prognosis is grave, though life may be prolonged by active and persistent treatment.

The peculiar psychic influence that governs us in modern society brings about various degenerations in the human organism. It is not the environment, but the many attributes due to heredity that influence one individual's thirst for alcohol and another's desire for tobacco. The gourmand, whose features and organs are engorged by unassimilable material, loaded with poisons for the blood, possesses an organism which is at once abnormal. To change this order of things brings before us a most complex problem. Primarily, the individual must be warned of the dangers before him, and the necessity of seeking advice. Secondarily, the

part of the clinician should be the early recognition and treatment of blood-pressure diseases.

The indications for treatment are: if the blood-pressure is supernormal, reduce to normal; if subnormal, raise to normal, and remove the cause of abnormal pressure whenever possible. Supernormal blood-pressure is best met by persistent use of tincture of *veratrum viride*, *aconite*, or their alkaloïds, in small, frequently repeated dosage. The nitrites, *atropine*, and iodides, combined with Fowler's solution, may be used with beneficial results, at the same time keeping the bowels, kidneys, and skin acting freely. The habits of the patient should be corrected. The patient should take light exercise in the fresh air before meals. The diet should be restricted, avoiding all forms of stimulants, meats, and the ingestion of large quantities of liquids.

Subnormal blood-pressure is met by *adrenalin*, alone or combined with physiologic salt solution, *ergot*, *suprarenal extract*, *hydrastinine hydrochlorate*, *digitalis*, *ammonia*, *camphor*, *alcohol*, *apocynum*, *strophanthin*, *caffeine*, *convallaria*, *physostigma*, and *strychnine*. These drugs must be absolutely pure. They may be used alone or combined as indicated.

A rigid hygienic system should be enforced. The patient should be given wholesome food, such as eggs, fresh meat, fish, milk, stewed fruits, vegetables, fats, and carbohydrates. He should have baths, plenty of rest, sunlight, and fresh air; should wear wool or silk and wool in all seasons.

Patients fare better in rural and mountainous districts or at the seashore.

I have presented the treatment by drugs and diet in a cursory way that I might add suggestions which I consider most important in treatment of blood-pressure diseases. I have found most diseases affecting normal circulatory equilibrium due to foreign substances in the blood. These substances so disturb the vessel-walls and nerve-supply, that they not only interfere with anabolism, but produce marked catabolism of the entire organism. The irritant may be a chemical or an organic agent, such as lead, alcohol, nicotine, arsenic, mercury, phosphorus, the various gases, products of autointoxication, and food poisons. The most pronounced of the biologic irritants are the *Spirochæta pallida*, bacillus of Eberth, diplococcus of cerebro-spinal meningitis, bacillus of diphtheria, diplococcus of pneumonia, *Plasmodium malarie*, bacillus of Pfeiffer, or their toxins. In uremic poisoning and eclampsia, the causes of which we do not exactly know, a regulation of the blood-pressure, blood-quantity, and blood-quality ameliorates the diseases.

The use of electricity, light, heat, and hydrotherapy in blood-pressure diseases is to be encouraged.

The most valuable adjunct to medical treatment is venesection. In any hypernormal pressure, when immediate relief is needed, venesection should be resorted to. This relieves the intracardiac and intravascular pressure. The specific gravity of the blood is reduced, the amount of toxic or irritant material

is lessened, engorgement of the lymphatics, and venous stasis, is relieved. The heart and vessels regain their equilibrium, and cell activity gives new life to the overworked organs. It may be remarked that this is a credible clinical picture. I call to mind a man who came of an apoplectic family. All were very stout. His brothers died at the average age of 45 years. Being the youngest brother, he had opportunity to learn the prodromal symptoms of the disease. At the age of 40 he began feeling the same symptoms as the brothers. He consulted a physician and was depleted of thirty ounces of blood. This he had repeated whenever he felt any return of the symptoms, sometimes as often as four or five times yearly. Today he is living and well at the age of 75. This man is one of many who have benefited by this so-called old and effete practice. In a paper on "Venesection; its Therapeutic Value," published in *Clinical Medicine* for January, 1907, I have presented the technique and results in some 600 cases of various diseases. I do not wish to be misunderstood as heralding venesection as a panacea. I want to impress you with its value. There are thousands of deaths every year from apoplexy, heart, and other diseases, where medicine is practically inert, that may be prevented by timely venesection. It bridges the chasm of empiricism, affects suggestive consciousness of the patient, and gives time for therapeutic accuracy.

In a conversation on venesection, one of the foremost educators and medical authorities in America said: "I do not know much about the value of

venesection, although I believe it is a good thing." This seems to be the status of the profession concerning the scientific application of venesection. This does not reflect on the individual physician, but it certainly casts a shadow over the teaching in our medical schools.

The object to be kept ever in view is the cause of the disease. This should be searched for carefully until found, and if not found the disease must be treated symptomatically.

In the study of abnormal blood-pressure, we have the underlying cause or sequence of over half the human ills, which makes it one of the most profound subjects known to the science of medicine. Much is understood and much is misunderstood. I have proven by my own experiments and observations that the life of the human organism, whether through heredity or other causes prone to be aberrated blood-pressure, may be prolonged ten to twenty years. So long as normal blood-pressure can be maintained, the life of the organism will be sustained until the natural sequences of decay result in death.

THE BLOOD-PRESSURE AND THE COMPOSITION OF THE BLOOD.

The data presented by Münzer show that many cases of anemia are distinguished by lymphocytosis and low blood-pressure for which a constitutional inferiority of the glands with an internal secretion is unquestionably responsible—the thymic-lymphatic

status. Persons with lymphocytosis and low blood-pressure stand general anesthesia badly, while persons with high blood-pressure usually stand it well. This is easily understood by the connection between the blood-pressure and the ductless glands, especially the chromaffin system. The chromaffin substance is used up during general anesthesia, and consequently persons with a constitutionally inferior chromaffin system are liable to suffer most from it. The discovery of lymphocytosis and a low blood-pressure thus warns of the need of caution before attempting operation under general anesthesia. Persons with high blood-pressure and normal or subnormal numbers of lymphocytes in the blood have a sound and vigorous chromaffin system and are thus able to take the anesthetic without harm, other things being equal. He adds that the various diatheses are probably merely the manifestations of the behavior of the ductless glands.

Schlayer relates considerable research in this line, the results being constantly negative in respect to any connection between hypertension in nephritis and the functioning of the suprarenals.

BLOOD-PRESSURE IN FEVERS.

Davidson points out that a sthenic fever is physiologically one in which the blood-pressure keeps high; an asthenic fever one in which it suffers diminution. The fall of pressure is to be ascribed to relaxation of the peripheral arterioles. In sthenic fever increased heart-action may more

than counterbalance arterial relaxation or the relaxation may be absent; in either event the pressure remains high. When relaxation is very marked, or the cardiac muscle is enfeebled by the circulating toxins, the fall in pressure is progressively more marked, as the systole is diminished in fever. Many of the *ill effects of fever* are in part attributable to the lowering of blood-pressure. *Ordinarily, pressure varies directly with the temperature*, but in fevers the two influences, pyrexia and intoxication, are at work, and as their effects on blood-pressure are opposed, and they are not always proportional to one another, the resultant effect necessarily varies. Davidson reports the results of examinations at the Edinburgh City Hospital. Of 37 cases of simple scarlet fever, in all the blood-pressure curve was very similar to those of the pulse and the temperature. *In severe scarlatina* cases of the anginose type, *the blood-pressure fell as the toxemia increased. In scarlatinal nephritis* in every one of 9 cases the *blood-pressure was raised during the period of albuminuria*, often commencing before the trace of albumin had been noted in the urine. *In diphtheria* reduction of blood-pressure was found in every case examined, depending on the degree of toxemia.

It showed a marked rise above the normal during severe albuminuria. Practically all patients with diphtheria were by routine practice put on strychnine and alcohol, and the fall of blood-pressure was to a large extent annulled. In patients who did not receive stimulation a fall was always

noted until the treatment was commenced. During routine administration over long periods the blood-pressure response to a single dose was apparently absent or less marked than that of following the first two doses; but, if the routine was suspended, the blood-pressure was noticed to fall accordingly. *After the administration of antitoxin in diphtheria*, in most cases there is a rise of temperature of one or two degrees, coming on four or five hours after injection. The pulse is accelerated at the same time, usually out of proportion to the temperature. The pulse-pressure in almost every case is either reduced or the same, the fall taking place within a quarter of an hour, and passing off within an hour. The effect is evidently one of temporary depression and permanent stimulation. *In typhoid fever the blood-pressure is always considerably lower*, the diminution progressing steadily the longer the duration of the case. *The pressure only rises again on the establishment of convalescence or the occurrence of some acute inflammatory complications.* Davidson reports one case of supposed scarlet fever, with an irregular temperature curve and a markedly subnormal blood-pressure. This aroused suspicion of typhoid fever, which was subsequently confirmed by Widal's test on the first and subsequent examinations.

BRONCHOPNEUMONIA.

A term applied to inflammation of the lungs that, beginning in the bronchi, finally involves the

parenchyma of the lungs. This disease may occur at either extreme of life. Three varieties are described: (1) a simple, acute form, following a severe bronchial catarrh; (2) a secondary form, occurring after the infectious fevers, tuberculosis, nephritis, cardiac disease, emphysema, and lodgement of foreign particles in the bronchial tubes; (3) a rare suppurative form, with the formation of abscesses in the lung. In addition to the bronchitis there are scattered areas of consolidation and collapse throughout the lung.

In children the onset is marked by convulsions, high temperature (104° F.), violent cough, rapid respiration (60 a minute), intense dyspnea, rapid and feeble pulse, cyanosis, and cold extremities. Localized areas of dullness are present, but usually not detected. Fine subcrepitant râles are heard posteriorly at the base of the lungs. Sibilant râles may also be present. The disease may be mistaken for lobar pneumonia, but the diagnosis can be made from the physical signs of the disease.

The treatment is absolute rest in bed and a nutritious diet; the chest should be enveloped in a thick cotton jacket. The temperature of the room should be equable—about 65° or 70° F. If the bowels are inclined to be constipated, fractional doses ($\frac{1}{4}$ gr.) of calomel are advisable every hour until 6 or 7 doses have been taken.

In the earliest stages the tincture of aconite is of service. Its action should be cautiously watched, and as soon as the pulse becomes soft, the drug may be omitted. Usually 6 or 7 doses are sufficient.

For a child over 2 years old:—

- ℞ Tincture of aconite ℥x;
 Simple elixir ℥xxxij;
 Sol. of potassium citrate q. s. ad ʒj.
 M. Sig.: One teaspoonful every three or four hours.

After the second or third day its action is too depressing and is not recommended. If the temperature rises above 102.5° F., it should be reduced by means of a cold bath. Phenacetin may be given to control the temperature, but should not be used routinely. After the third or fourth day a flaxseed poultice containing mustard may be applied to the chest and renewed every hour. After the poultice has remained on the chest about two hours, give the syrup of ipecacuanha (℥xv) every ten minutes until emesis is produced. Both these procedures should be repeated on the following day. When the poultice is removed, replace it by a cotton jacket. If the heart is weak, give cardiac stimulants.

Venesection may do good in bronchopneumonia following hemoptysis, when the right heart is overworked or dilated, blood-pressure high, and pulmonary edema, cyanosis, and coma imminent or present. After venesection in bronchopneumonia, salt solution should be given by hypodermoclysis.

DELIRIUM, ACUTE.

Anders defines acute delirious mania as an acute maniacal delirium associated with hallucinations, with a febrile course, of limited duration, and of grave prognosis.

It may be primary or it may be secondary to infection, intoxication, exhaustion, irritation (peripheral and central), and senility.

The disease usually commences with certain indefinite prodromes. These consist of restlessness, associated either with melancholia, preoccupation, or anxiety; decreased intelligence, loss of appetite, constipation, and emaciation. The patient may suddenly become violent. The prodromal stage rapidly passes from that of excitation to collapse. The tongue is dry, the pulse rapid and weak. The temperature may rise to 105° F. There is rapid emaciation, profound exhaustion, and usually death.

The differential diagnosis is oftentimes difficult. Typhoid and pneumonia are often confused with acute delirium.

The medicinal treatment is unsatisfactory. Calomel, in the early stages, should be given in massive doses. Hyoscyamus and its alkaloids are the best hypnotics. The temperature should be combated by baths, and the ice-bag to the head. Solivetti has obtained excellent results by the administration of Bonjean's ergotin (hypodermically). In spite of the progressive exhaustion, blood-letting is recommended (Anders). About 500 c.c. should be withdrawn and an isotonic solution given intravenously. Strychnine, alcohol, and the judicious administration of milk, eggs, broths, etc., by forced feeding are indispensable.

EAR DISEASES.

Acute catarrhal otitis media is frequently caused by acute coryza and the infectious fevers.

A moderate spray of Dobell's solution may be used. If pain is present, dry heat may be applied. A few drops, warmed, of carbolic acid solution (1:40), or one of formalin (1:2000), may be instilled into the ear. Bishop has found that leeches may often give speedy relief. Two Spanish leeches may be applied in front of the tragus and two behind the auricle for adults. The external canal is stoppered with cotton so that the leeches cannot enter it. The skin is pricked until a drop of blood appears; then the leech in a 2-dram vial, with its mouth at the opening of the bottle, is placed so that its mouth covers the drop of blood. The vial is held in position until the leech takes secure hold. Then the bottle is removed and the leech allowed to fill and drop off. This manner of applying leeches is given because few seem to be conversant with the subject, and this method removes the common objection to handling the repulsive animals. Especial care should be exercised to abstract the blood in middle-ear inflammation as much as possible from the region of the tragus, on account of the intimate relation of the blood-vessels of this region and the anterior of the meatus with the vessels of the tympanic cavity. If enough blood has not been abstracted after the leeches fill and fall off, more can be drawn by applying napkins wrung out of warm water. If there should be any difficulty in stopping

the bleeding of the leech-bites, pressure applied to them will succeed. The artificial leech is also an excellent device, but occasions more discomfort.

Inflammation of the mastoid cells is evidenced by deep-seated pain and tenderness over the mastoid process, more or less fever, swelling, and, if pus has formed, fluctuation. Leeches and hot fomentations applied over the mastoid often give relief. If the symptoms continue, the soft tissues over the mastoid should be incised. In bad cases it is necessary to open the mastoid cells.

ECLAMPSIA.

Williams defines eclampsia as "an acute disease which may occur in the pregnant, parturient, or puerperal woman, and is characterized by clonic and tonic convulsions, during which there is loss of consciousness followed by more or less prolonged coma." It is said to occur about once in 500 pregnancies. It is due to the retention in the system of toxins that normally should be eliminated.

Dienst explains his grounds for the assumption that the symptoms of eclampsia are the result of an overaccumulation of fibrin in the blood. The filaments of fibrin cause disturbances in the circulation, thrombosis and consecutive necrosis of the parenchyma, especially of the liver. The resulting insufficiency of the liver leads to imperfect neutralization of the toxins generated in the metabolism, thus inaugurating a vicious circle. Retention of salts is a further indispensable factor in the development of

eclampsia, as the excess of fibrin alone is not sufficient to induce it. Pregnancy nephritis causes retention of salt and thus proves an indirect factor. The leucocyte count suggests that dropsy without albuminuria, "pregnancy kidney," and eclampsia are links in the same chain.

Graf and Landsteiner relate the results of extensive experimental research which have demonstrated beyond question the enhanced toxicity of the blood-serum in eclampsia in comparison to normal serum. At the same time their research does not indicate any special eclamptic poison, but merely that the serum contains an abnormal excess of the toxic substances naturally in the serum. Waste poisons seem to be accumulated in abnormal proportions.

The next step is to determine whether or not the serum acquires this extra toxicity in other pathologic processes besides eclampsia.

H. Vaquez calls attention to the fact that obstetricians have for a long time observed during an attack of eclampsia, and particularly during the convulsive seizures, that the pulse is hard and tense and that the heart-sounds are markedly altered, the second aortic sound taking on a clanging timbre which is very characteristic.

These observations have given rise to the belief that during the eclamptic attack, and even before, there are marked alterations in the cardiovascular system. He analyzes the historic evidence which substantiates this view, and reports a number of studies in blood-pressure which tend to point in the same direction—that a pronounced vasoconstriction

occurs as an essential feature in the pathogenesis of the eclamptic state. He does not add any new hypothesis in his *résumé*, but he holds that the hypotheses thus far supplied are not sufficient, since they do not take into recognition the essential symptoms of hypertension, which is evidence of vascular disturbances the pathogenesis of which is still in an unsatisfactory condition. A definite pathogenic theory of eclampsia should be able to account for the hypertensive vascular crises, which is the real essence of the eclampsia, the convulsive attacks, and the visceral modifications. Vaquez is under the impression that the difficulty will be found in disturbances of the thyroid and suprarenal glands, whose function he assumes is largely to regulate the arterial tension.

The treatment of the attack consists of the administration of chloroform by inhalation, chloral hydrate (gr. lx) by enemata, and the fluidextract of veratrum viride hypodermically (gtt. xx followed by sufficient dosage to keep the pulse at 70, or below, beats a minute), to control the convulsions, and free purgation, free sweating. The induction of labor should be brought about when it is least likely to effect the vitality of the patient.

This treatment of eclampsia, Peterson asserts, has given rise to much discussion. By some it is regarded as the heroic, but specific treatment of the attack. Large quantities of blood were formerly extracted. At present, however, phlebotomy is only used in plethoric cases, and not more than three hundred grams of blood are removed. He empha-

sizes the fact that blood-letting reduces arterial tension and likewise diminishes the quantity of toxins in the circulation. Three hundred grains of blood, according to Bouchard, will thus secure the elimination of five grains of toxins. The operation should be performed upon the median cephalic or other visible vein upon the anterior surface of the elbow. After the withdrawal of the blood an equal or double amount of salt solution (the author would suggest Adler's or Loeb's solution) at a temperature of 120° F. would be best injected into the vein. The solution not only dilutes the toxic blood, but produces diaphoresis.

In the experience of Lusk, the indications for treatment during the outbreak are for the most part the same as laid down for uremic symptoms unattended by convulsions, viz., to lower the arterial tension, to diminish to the fullest extent practicable the irritation of the vasomotor and convulsive centers, and to restore to the kidneys their normal functions. Spiegelberg claims that these three indications are most completely fulfilled by venesection. Professor Fordyce Barker pleaded for the restoration of the lancet in the management of puerperal convulsions, insisting upon the unmistakable clinical evidences favorable to its employment. In my student days in Paris, at the Hôpital des Cliniques, where the ancient usage was in full favor, I well remember my first feelings of alarm at the vigor of the treatment in vogue; but after carefully watching the cases to the end I was led to conclude that the claims of bleeding in eclampsia rested upon a substantial foundation.

Lusk states that the special advantage of venesection lies in the rapidity of its action; incidentally it favors absorption and renders the patient more susceptible to the influence of other remedies. It forms, therefore, naturally the first step in the treatment of convulsions. The quantity of blood to be withdrawn varies from eight to sixteen ounces, according to the vigor and, to some extent, according to the size of the individual.

Williams, in his excellent work on obstetrics, discusses the treatment of eclampsia from a scientific but common-sense way. He gives in detail the induction of labor. After the birth of the child no attempt should be made to hasten the third stage of labor, as a moderate loss of blood should be encouraged rather than checked. If the patient does not show marked signs of improvement shortly after delivery, from 300 to 500 c.c. of blood should be withdrawn. If beneficial results follow, the procedure may be repeated if necessary. As the average woman possesses from eight and one-half to nine pounds of blood, 500 c.c. would represent from one-eighth to one-ninth of its total bulk. Accordingly, if that amount of blood is drawn off and replaced by an infusion of an equal quantity of salt solution, the remainder of blood is so diluted that, for practical purposes, one-fourth or one-fifth of the total poison has been removed, and this aid is often sufficient to tide the patient over sufficiently long to allow nature to reassert herself.

It is generally stated that bleeding is indicated only when the pulse is full and bounding. Williams

has bled, with most excellent results, a number of patients whose pulse was thin and weak. This experience would certainly show that venesection is indicated in all cases in which delivery of the child is not followed by a cessation of the convulsions, no matter what the condition of the pulse.

EMPHYSEMA.

The name *emphysema* is given to the exaggerated dilatation of the pulmonary tissue by air. When emphysema is limited to the alveoli or the lobules, it is said to be alveolar or intralobular; but when the lobule is ruptured, and the air invades the interstitial tissue of the lung, the emphysema is interlobular (Dieulafoy).

The symptoms are a gradual onset, distressing cough with expectoration of whitish and very tenacious mucus, labored respiration, dyspnea upon slight exertion, early exhaustion, soft and accelerated pulse, and slight cyanosis. The chest is enlarged in a peculiar manner and gradually becomes barrel-shaped. It generally occurs in the course of asthma, tuberculosis, or chronic bronchitis.

The treatment consists of rest, tonics, and stimulants. The various symptoms are generally met as they develop.

Patients who come into the hospital in a state of urgent dyspnea and lividity, with great engorgement of the veins, particularly if they are young and vigorous, should be bled freely. On more than one occasion I have saved the lives of persons in this condition by venesection (Osler).

EPILEPSY.

Epilepsy is a condition manifested or characterized by attacks of unconsciousness, with or without convulsions. According to the severity of the condition it is called *petit mal* or *grand mal*. The convulsions may be tonic or clonic, or may alternate. A family history of rachitis, malnutrition, nervous disorders, alcoholism, syphilis, poor physique, abnormal and difficult labors, injury to the cranium, the infectious fevers, intestinal worms, and disorders of menstruation are some of the causes.

In an article on "Hypertonia Vasorum Cerebri," published in 1908, I stated that I had "long held the hypothesis that epilepsy is the sequel of an *angio-neurotic artericstenosis*, or disturbance of the circulation of the convolutions, producing, in accordance with the intensity of the spasm, *le petit mal* or *le grand mal*. The foregoing hypothesis is not founded upon mere supposition, but upon clinical evidence presented by 52 cases cured by the regulation of the circulation." To illustrate, one of these cases became pregnant before menstruating after the birth of a child. About the end of the fifth month she began having two and sometimes three attacks every twelve hours. The bromides, alone and in their various combinations, were administered to no effect. The patient was steadily growing worse, and at my wits end I decided to induce labor. When I advised the family what I was going to do, the mother of the patient, an elderly Italian woman, advised that I do a venesection, saying that in her

young womanhood venesection had relieved her of the same condition. Guided by this timely advice, I withdrew twelve ounces of blood, which was repeated in a week. After the first bleeding the attacks were reduced to one a day. After the second bleeding the bromides were administered and the attacks gradually subsided and, at the end of the fourth week, entirely. The patient was delivered at term and has never, so far as I can learn, had a return of the condition.

In the second Goulstonian lecture, 1909, Russell discusses the correlation between the circulatory changes postulated as the precipitating factor in the epileptic fit and the various symptoms of and the recovery from the attack. Under this head he discusses the *aurà*, unconsciousness, convulsions, the physiologic mechanism from recovery underlying epileptic fits, and the postepileptic phenomena. He considers vasomotor spasm in the brain as a cause of epilepsy and discusses *petit mal*, infantile convulsions, and Jacksonian convulsions. He describes the symptoms following on prolonged and cerebral enema as well as similar symptoms resulting from prolonged chloroform syncope.

Russell describes the results of experimental study of the restoration of circulation after the blood-supply of the brain has been cut off. He discusses the time limit of recovery of the brain from arrest of the circulation, the post-mortem condition of the brain, reviews the symptoms, and regards the diminution in the blood-flow through the brain as the result of increased intracranial tension. His

observations, clinical and pathologic, lead him to the conclusion that the fundamental condition underlying the *status epilepticus* is cerebral anemia.

W. Russell, 1914, discusses a special condition in which there is spasm constriction of the arterial channels in localized areas of the brain; the term "cerebral angiospasm" is given to this condition. Although the cerebral vessels cannot be seen, the vessels of the retina can be examined by means of the ophthalmoscope, and it has been clearly established that angiospasm occurs in these vessels. Various observers have noted that a temporary loss of vision of one-half of the retina may be associated with marked diminution in the size of the retinal vessels corresponding to the blind field, and that vision returns with the relaxation of the constricted vessels and the re-establishment of the normal blood-supply to the part. From these observations alone Russel believes it is fair to postulate that corresponding constriction can take place in the arteries in localized areas of the brain.

In 1908 I described the conditions above referred to and mentioned that "the occurrence of spasms of the arteries caused complete loss of function for a time. In the retinal picture of arteriospasm, we have the explanation of visual and sensory disturbances, and other important pathologic conditions. A distinct homonymous defect may be the first evidence of organic disease." At that time I made my deductions as to the etiology of epilepsy, and since that time have known of no reason why I should change my hypothesis.

A merchant of 41 came under my service April 9, 1915. Family history was good. He showed a tendency to erythremia. Patient had had diseases of childhood and enjoyed good health until 17 years of age. He states that he received a blow from a rock upon the head posterior to and slightly above the mastoid. Some months later he began to have mild convulsions once every six months, at night. These attacks confined him to bed two or three days. The attacks began to increase in frequency. At the age of 23 he had facial paralysis, which lasted for one month. When the patient came under my service he was having eight convulsions during the day and three and four during the night.

Unconsciousness and convulsions were always of *grand mal* type. No auræ present at any time. The attack came like a bolt from a clear sky. The heart and lungs were normal. The blood showed nothing abnormal, except increased viscosity and high color index. The urine was high colored, 1025 sp. gr., with an abundance of bile and indican; no casts were found. Blood-pressure was 145 mm. Hg.

The diagnosis is naturally, on first thought, epilepsy due to traumatism. The examination of the site of traumatism did not reveal any depression, nor was it in that part of the skull where traumatism would have a tendency to cause epilepsy. The increased viscosity of the blood, increased blood-pressure, indican, and specific gravity led me to infer that the epilepsy was due to circulatory disturbance. From this inference my treatment was directed toward the vascular crises.

The patient was given 15 gr. potassium iodide *t. i. d. p. c.*, and gradually increased to physiologic effect. Glonoin was given in $\frac{1}{100}$ -gr. doses every three hours. All salty foods and dark meats were prohibited. The patient was free from the attacks for one month; then they began to return. The patient was bled about twenty ounces. He obtained immediate relief and had no recurrence of attack for two months. Domestic and financial worries at this time caused a return of attack. He complained of intense pain in the head and stated that he felt as though he was going insane. His eyes were injected, face congested, and gait unstable. He was again depleted of twenty ounces of blood. This gave him immediate relief. August 15, owing to exposure to heat, the patient had an attack and was bled about sixteen ounces from the left leg. There has been no recurrence of the epileptic attacks. The patient's weight has been reduced from 224 lbs. to 180 lbs. He has improved mentally, physically, and in general efficiency. I mention this case to show the good that may be accomplished by persistent treatment in these apparently hopeless cases.

Some authors claim that venesection has no place in psychiatry. If there is a place in the whole system of medicine that venesection is needed as an adjunct in treatment, it is in the beginning of a vast number of mental and nervous diseases.

A schoolgirl of 9 came under my service October 26, 1915. Good family history. Had usual diseases of childhood, and was in apparent good health until July, 1914. At this time she began having

convulsions. The attacks gradually increased until she was having ten a day. She was not able to walk; had facial paralysis and dribbling of saliva. Pain in head; mentality much impaired.

A diagnosis of tumor was made and treatment directed accordingly. The following prescription of J. C. Wilson was used:—

℞ Hydrarg. chloridi corros. gr. j;
 Tinct. ferri chloridi ʒij;
 Liq. arseni chloridi gtt. xlviij;
 Potassii iodidi ʒij;
 Syr. zingiberis ʒiij;
 Aquæ q. s. ad ʒvj.

Sig.: A teaspoonful *t. i. d. p. c.*

The treatment was not effective until the patient had a free hemorrhage from the nose. The treatment appeared to take effect almost immediately after that. The potassium iodide has been increased from time to time, and the prescription varied to suit the case.

The patient has improved rapidly. The attacks have been reduced from ten daily to one or two weekly. This treatment will, with an occasional venesection, eventually result in a cure.

ERYTHREMIA.

A disease characterized by a persistent increase of the red blood-corpuscles, a condition of plethora, splenomegaly, and at times cyanosis.

The three cardinal features are a change in the appearance of the patient, enlargement of the spleen,

and hyperglobulism. The superficial blood-vessels, capillaries, and veins look full, so that the skin is always congested, in warm weather of a brick-red color, in cold weather cyanosed. The engorgement of the face may be extreme, extending to the conjunctiva, and in the cold the cyanosis of the face and hands may be as marked as any that is ever seen. There is often, too, a remarkable vasomotor instability, *e.g.*, the hand becoming deeply engorged when held down, and rapidly anemic when held up. The spleen is usually moderately enlarged, hard, firm, and painless.

The total bulk of blood is enormously increased, and the ratio of corpuscles to plasma is high. The polycythemia ranges from 7 to 12 or even 13 millions of red corpuscles per c.mm. Hemoglobin ranges from 130 to 160 per cent., but the color index is relatively low.

Headache, flushing, and giddiness are common symptoms. Constipation and intestinal fermentation are common, and albuminuria is usually present. The blood-pressure is high; occasionally there may be hemorrhages into the skin and from the mucous membranes. Recurring ascites, probably in association with splenic tumor, may present itself.

Diagnosis may be based upon the triad of features above referred to, in absence of congenital heart disease, emphysema, and forms of cyanosis associated with poisoning by coal-tar products.

The prognosis is bad for cure, but the condition may persist for years with reasonably good health. Cardiac failure, hemorrhage, and recurring ascites have been the usual modes of death.

The treatment should be directed to the hemato-poietic system. When there is much fullness of the head and vertigo, repeated bleedings give relief. Inhalations of oxygen may be tried when the cyanosis is extreme. Calomel, gamboge, jalap, saline purges, and low diet are helpful.

EYE DISEASES.

Fuchs sums up the uses of venesection in treatment of diseases of the eye in the following language: "In recent cases of choroiditis with hyperemia of the retina the abstraction of blood is recommended, and that by the application of leeches behind the mastoid process. While blood-letting has pretty much disappeared from general practice, in ophthalmology it has remained in use up to the present time, and rightly, too, since in suitable cases striking and undeniable advantage is often seen to accrue from it. The abstraction of blood may be made with natural leeches or with Heurteloup's artificial leech. In the former case, six to ten leeches are applied; in the employment of the Heurteloup, its glass cylinder is filled once or twice with blood. The point of application is either the temple or the skin behind the mastoid process. If we are dealing with inflammations of the conjunctiva, the iris, or the ciliary body, the temple is selected, because the vessels of the conjunctiva empty into the veins of the face, and, moreover, the anterior ciliary veins communicate freely with the veins of the conjunctiva. In deep-seated affections, choroiditis,

retinitis, neuritis, or inflammation in the orbit, the abstraction of blood is performed behind the mastoid process, because an emissary vein of Santorini (passing through the mastoid foramen), which carries off blood from the transverse sinus, empties here; and the latter is connected with the cavernous sinus, into which the ophthalmic veins pour their contents."

FEVER, TYPHOID.

Typhoid fever is a general infection caused by the *Bacillus typhosus*, characterized anatomically by hyperplasia and ulceration of the intestinal lymph-follicles, swelling of the mesenteric glands and spleen, and parenchymatous changes in other organs. There are cases in which the local changes are slight or absent, and there are others with intense localization in the lungs, spleen, kidneys, or cerebrospinal system. Clinically the disease is marked by fever, a rose-colored eruption, diarrhea, abdominal tenderness, tympanites, and enlargement of the spleen; but these symptoms are extremely inconsistent, and even the fever varies in character (Osler).

The treatment is largely supportive and prophylactic. Careful nursing, a regulated diet, and the proper application of hydrotherapy are the essentials in the majority of cases. The patient should receive 2000 to 3000 calories of food, which may consist of milk in any form, cream, cocoa, strained soups, gruels, jellies, coffee and tea with cream, toast, junket, and eggs, raw or soft boiled, or egg-lemonade.

There is no specific drug treatment, but it is advisable to give hexamethylenamine after the first week, 15 to 20 grains daily. In private practice, I order hydrochloric acid, dilute, 20 drops, and tincture nux vomica, 10 drops, every four hours after nourishment. I very often employ small doses of quinine and salol. The quinine undoubtedly has a neutralizing effect upon the action of the toxin.

The special symptoms are treated in relation to their severity and development. The severe toxemia is one condition that taxes our skill and ingenuity.

The hemorrhage and intoxication are two factors in typhoid fever that usually give the general practitioner the most concern. The effect of hemorrhage and venesection in typhoid will be noted in two of a series of cases reported by me in 1907:—

CASE 1.—W. N., female, aged 34, weight 165, married, came under my service August 16, 1903. The patient gave history of usual diseases of childhood and simple continued fever in 1902.

Clinical History.—The patient was in the second week of the disease when I was called. The usual symptoms indicating typhoid were elicited, which the diazo-reaction verified. The fever and pulse were not exaggerated. Nocturnal delirium, stupor, subsultus tendinum, and carphology were marked. On the morning of the nineteenth day I was called about 3 o'clock and found the patient bleeding profusely from the nares. The hemorrhage was stopped by plugging the nares with linen. The

patient lost approximately eighteen ounces of blood. The temperature dropped rapidly to 98° F. Although the temperature arose to 102.5° F. on the twentieth and the day following to 104° F., the condition of the patient improved and continued to improve from day to day. The tenth day after the hemorrhage, on the twenty-ninth of the disease, the temperature was normal.

CASE 2.—M. M., female, aged 24, gave a history of the diseases of childhood, and syphilitic infection at the age of 18.

Clinical History.—Diagnosis from manifest symptoms was typhoid, and was confirmed by Widal test and diazo-reaction. Patient was allowed by mother to use commode and assist herself *ad libitum*.

I was called one afternoon in the third week of the disease and found patient having a hemorrhage from intestines, nares, and ears. The pulse was full and bounding. I immediately opened the median basilic vein and bled the patient of sixteen ounces. Hemorrhages ceased and condition began to improve immediately. Patient was convalescent in twelve days from time of venesection and made an uneventful recovery.

Rudolph reports his deductions made from a series of cases at the Toronto General Hospital; 1914:—

In studying the last 1591 cases of typhoid treated in the Toronto General Hospital it appears that the

mortality was 8.67 per cent. over all, but that the death rate among those reported as having had one or more hemorrhages was 37 per cent. This latter figure is almost the same as occurred in Cuschmann's series at Leipsic, which was 38 per cent., while in Strümpell's 45 cases of hemorrhage in typhoid it was 42.2 per cent. In the Toronto series, excluding the cases that had been bleeding, the mortality of the remaining 1464 cases was only 6.3 per cent. Rudolph cites 12 cases which show how the bleeding was followed by a more or less marked fall not only in the temperature, but also in the pulse rate. They are said to be the best examples, but most of the other 115 charts of cases of bleeding showed more or less of the same thing.

The improvement in the temperature and pulse curves, while often transient, in some cases lasted for days and even ushered in convalescence.

Rudolph agrees that it is difficult to explain how the good effects that may follow a hemorrhage come about. There is no doubt, however, that it produces a profound effect on the whole bodily economy. Thus bleeding has been shown to bring about an increase in the flow of urine, to greatly increase the intake of oxygen, with proportionate raising of tissue-oxidation. It hastens the coagulation time of the blood more than does any other single agent. It produces a rapid increase in the antibodies contained in the blood. The agglutinating power of the blood is enormously raised by the bleeding. Further, in toxic conditions, such as uremia and other less-defined states in which there

is high blood-pressure, bleeding appears in some way to lessen the toxemia, and possibly in typhoid it may have some similar effect.

Rudolph agrees with Whitehead, who two years ago [previous to the writing of this article] suggested the good effects of hemorrhage in typhoid might be attained and the evil ones (associated with intestinal hemorrhage) avoided by the timely use of venesection in those cases which are not doing well on account of severe infection and toxemia. Venesection, he says, appears to be indicated in severe cases; and if the removal of blood by venesection be a moderate one, say of six to fourteen ounces, it can do no harm and may possibly be productive of great good.

FEVER, YELLOW.

An acute, specific fever of tropic and subtropic countries, characterized by a toxemia of varying intensity, with jaundice, albuminuria, and a marked tendency to hemorrhage, especially from the stomach, causing the "black vomit." The specific organism has not yet been found, but the disease is capable of being transmitted through the bite of the mosquito, the *Stegomyia fasciata* (Osler).

The prophylactic treatment consists largely in perfect sanitation, with inspection and quarantine of suspected individuals or goods from infected ports.

Careful nursing and a symptomatic plan of treatment probably give the best results. Rest in bed, cleanliness, ventilation, and disinfection are

necessary measures. Castor oil, calomel, or salines should be given to empty the bowels. Diaphoresis by hot packs or mustard foot-baths is essential. The diet should be liquid and freely given. Hydrotherapy is used to control the temperature.

Bleeding has long since been abandoned. How much patients will stand in this disease is illustrated by Rush's practice, which was of the most heroic character. He says: "From a newly arrived Englishman I took 144 ounces, at 12 bleedings, in six days; 4 in twenty-four hours. I gave within the course of the same six days nearly 150 grains of calomel, with the usual proportions of jalap and gamboge." With the courage of his convictions this modern Sangrado himself submitted to two bleedings in one day, and had his infant of 6 weeks old bled twice (Osler).

GOUT.

A form of perverted nutrition due to a retention of uric acid and other purin bodies in the system, characterized clinically by attacks of acute arthritis, the deposition of sodium-biurate in and about the joints, and by the occurrence of irregular constitutional symptoms.

The treatment has for its main object elimination. Laxatives such as calomel and salines are indicated. Tincture of colchicum seeds, 10 drops, and veratrine should be given during the attack. Absolute rest of the parts, local applications of ichthyol in lanolin, a select diet, and mineral water

are quite necessary. Between attacks an open-air life, with plenty of exercise and regular hours, and properly selected hydrotherapy are advantageous in bringing about a cure.

Garrod and his associate, Todd, have noted the interesting fact that after local depletion, with leeches, joints thus treated remain permanently weakened, and may even become completely ankylosed. Before the days of aseptic surgery there was also no little danger of erysipelas and other infections through cutaneous wounds that were thus inflicted (Lyman).

When the brain is the seat of *retrocedent* phenomena, the symptoms of coma are rapidly developed. Under such circumstances, if the patient be plethoric, blood should be taken from the arm to the amount of ten to fifteen ounces. Some of these cases are really due to uremia, and bleeding is in such as useful as it is in puerperal eclampsia. Bloodletting should be followed by a drastic purge with calomel and jalap, or with croton oil if there be difficulty of deglutition (Lyman).

HEART DISEASES.

The diseases of the heart are varied and complex. In health we are unconscious of the action of the heart. One of the first indications of debility or overwork is the consciousness of the cardiac pulsations, which may, however, be perfectly regular and orderly. Heart disease is either functional or organic. The discussion will be only briefly touched

upon, and the space devoted to the more prominent etiologic factors and treatment where venesection is indicated.

Darlington states that heart disease among school-children is greatly 'on the increase. Of the defective children in the schools that had been examined by him, 3500 had heart disease in some form. During two years 1234 children died from heart disease, and only 131 of these were under 5 years of age. With the beginning of school-life the rate increased 28 at the age of 4 years, 286 at the age of 15.

Darlington recapitulates impressions gained from a study of heart disease in the United States as follows:—

1. The mortality rate from heart disease is steadily increasing.

2. This increase is general throughout the United States, and is apparently unaffected by climate conditions, locality or density of population.

3. The correlated condition, chronic Bright's disease, shows a corresponding increase in mortality.

4. The general death rate is steadily decreasing.

5. No other disease shows a general relative increase in its death rate.

6. The commonly accepted cause of cardiac affections cannot be held responsible for the increased death rate without further study of their etiology.

7. The effect produced by high-strung nervous tension, induced by modern methods of social and business competition, must be regarded as a causa-

tive factor in the production of functional and ultimately organic cardiac disease.

8. The medical profession has before it an opportunity of great moment in teaching the doctrine of right living, advocating a saner and more wholesome attitude toward life, and standing as a unit against false standards of material gain and advancement obtained by the sacrifice of the normal healthful and peaceful attributes of calm mental poise, equable temperament, and physical well-being.

Functional heart disease is made manifest by various alterations in the heart-beat, temporary or habitual; in the volume, force, time, etc. They may be due to organic brain disease, psychic disturbances, neuroses, reflex influences, as from disturbances of the gastrointestinal tract and kidneys, toxins, such as tea, coffee, alcohol, tobacco, and those of the infectious fevers, and various discrasias, and organic disease of the heart itself.

Heredity, syphilis, tobacco, alcohol, mental strain, gluttony, and modern methods of preparing foodstuffs are far the most important factors in the etiology of cardiac diseases.

In the discussion of *prevention of valvular disease*, Caton reminds us that in acute rheumatism the inflammatory changes in the joint tissues and the endocardium respectively are alike in kind, but the essential treatment of rest is not equally possible of application. The work of the heart varies with times and circumstances, however, so that within limits the amount can be regulated, if we take suffi-

cient trouble. Pain and fever can be lessened by adequate doses of some salicyl compound or other measures appropriate to the condition. Absolute rest of mind and body, light diet, a gentle sedative in sleeplessness, fairly full doses of sodium or potassium iodide three or four times daily, to aid absorption, lessen the volume of the blood and diminish blood-pressure. These measures slow the heart and diminish its amount of work. Secondly, through the first four dorsal nerves, in their distribution between the clavicle and the nipple, the trophic and vasomotor nerves of the heart can be stimulated without exciting the muscle-fibers. This is effected by small blisters, applied one by one. The rest treatment is the most important and must continue for six or eight weeks, or even longer, and it must begin early, before marked changes occur. This depends on a capacity to recognize the advanced stages of valvular disease in the making. The first sound at the apex consists of two elements: (1) the less important muscle sound; (2) the crack of the stretched valve-ducts made taut by the sudden rise of pressure of the blood-stream under the powerful squeeze of the ventricle. Thickening and stiffening of the valve-membrane from inflammatory change, with subendothelial effusion, and the formation of vegetations gradually change the clear sound into a longer and duller one, eventuating in a whiffing sound that ultimately develops into a real regurgitant bruit.

When making *office tests of heart functioning*, Waldvogel examines the systolic blood-pressure with

the patient horizontal and again as the patient stands, and summarizes his findings with 130 patients. This simple test of the systolic pressure as the patient lies and stands up can never prove an exertion for the heart, while nervous influences are almost entirely excluded, and the effort is proportionately the same for all human beings. As the patient reclines the Recklinghausen cuff is applied and the Riva-Rocci manometer is applied to the heart region. The patient holds the manometer with his free hand and the systolic pressure is noted twice. Then the patient is told to get up quietly; as he stands he holds the manometer with his free hand, on a level with his heart, and again the systolic pressure is noted twice on the arm bent at the elbow, the wrist lightly supported by the observer. Quick work is necessary, as the pressure soon fluctuates. He tabulates the findings in six tables, the first showing the cases with the same pressure in both positions, the other showing a rise or fall in the pressure, from 5 to 20 mm. or more, from the change of position. It seems evident that a drop of 10 or 20 mm. on standing is an index of a pathologic condition in heart-action, although a drop of 10 mm. is still within normal range. The greatest difference, 35 mm., was observed in a case of contracted kidney and alcoholism.

Hahn relates a number of cases to show the excellent effects of venesection when the circulation of the lungs is interfered with. The circulation in the lungs provides a regulating reservoir for the blood, and the effect of venesection is felt here first

and most intensely. Especially in arteriosclerosis, permanent benefit is derived from venesection, possibly from reduction of the viscosity of the blood. Experiments on himself showed that venesection induced a feeling of agreeable lassitude, an outbreak of sweat, and somnolency. Among the experiences related was the arrest of incipient edema of the lungs in severe heart disease in a hard drinker, and the relief of distress in a patient with emphysema of the lungs and, secondly, weakness of the right ventricle.

At any stage in a valvular lesion or in hypertrophy and dilatation of the heart from any cause, acute cardiac insufficiency may arise associated with dyspnea, more or less cyanosis, irregular action of the heart, the gallop rhythm or embryocardia and a small, rapid pulse. In typical form this is seen in cases of arteriosclerosis, in hypertrophy and dilatation from overexertion, but it may occur in any form of valve lesion. It is the one condition in heart disease in which venesection is advantageous. For many years now this practice has been carried out at the Johns Hopkins Hospital with the greatest benefit. In many hands it is not satisfactory, because sufficient blood is not taken. Good results are rarely seen unless as much as 20 ounces is taken. To "breathe a vein" skillfully is now almost a lost art, and to get enough blood is sometimes necessary to bleed from both arms. Hypodermics of ether in dram doses, strychnine in $\frac{1}{30}$ grain, or digitalin in $\frac{1}{20}$ grain, or camphor may be administered. Locally, apply hot mustard leaf (Osler).

The management of the *stage of incompetency* consists in rest, resistance exercises, massage, Nauheim baths. The selected use of digitalin, aconitin, vasodilators, sparteine sulphate, diuretin, laxatives, morphine, and strychnine may prove efficient for temporary use. Undoubtedly there are many cases in which the letting of twenty to thirty ounces of blood proves a timely measure and starts the patient on his uphill journey. When arterial tension is so high and the pulse so bounding as to congest the head and threaten apoplexy, a vein may be opened and sixteen to twenty ounces of blood be abstracted with immense benefit.

The accompanying diagram illustrates beautifully the graphical outline of the organs that are relieved by venesection.

Nature sometimes gives a hint in this direction by the production of severe epistaxis. The nose-bleed is sometimes hard to arrest and requires plugging of the nares, but afterward the patients are unquestionably relieved from a condition of hypertension which might prove most dangerous.

In the *treatment of pericarditis*, if the dyspnea is the result of pulmonary congestion and does not yield to local application to the precordium and to internal stimulation, recourse should be had to venesection. In any condition attended by overstrain and distention of the right ventricle, venesection, even if copious, is not dangerous. The more quickly the blood flows, the greater will be the fall in blood-pressure in the right ventricle, and therefore the greater its relief. If the loss of blood is deemed

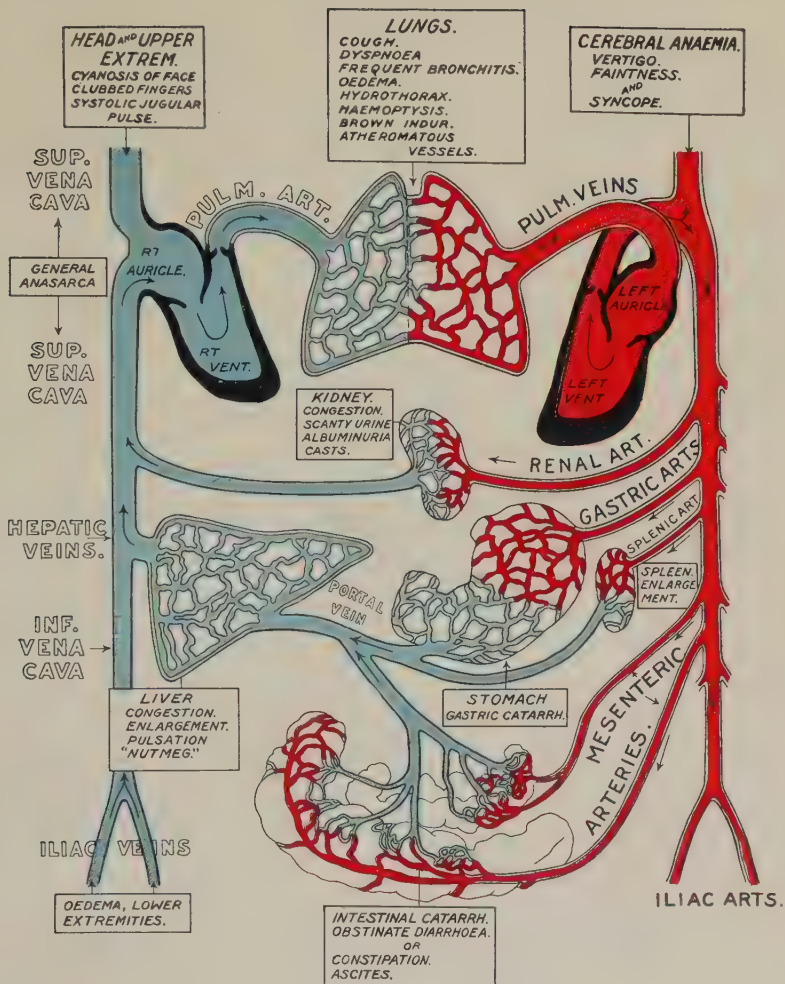


Diagram showing the indirect (peripheral) effects of valvular lesions. This diagram is also of service in tracing the direct (cardiac) changes due to valvular defects. The indirect results are catalogued in the sign squares.

undesirable, an equal quantity of saline solution may be given subcutaneously to replace the volume of the blood lost.

In cases of *dilatation*, from whatever cause, whether in mitral or aortic lesions or distention of the right ventricle in emphysema, when the signs of venous engorgement are marked and when there is orthopnea with cyanosis, the abstraction of from twenty to thirty ounces of blood is indicated. This is the occasion in which timely venesection may save the patient's life. It is a condition in which I have had most satisfactory results from blood-letting. It is better done early than late. I have on several occasions regretted its postponement, particularly in instances of acute dilatation and cyanosis in connection with emphysema (Osler).

Forchheimer emphasizes the fact that venesection is at times of the greatest value. When the right heart is overfilled and a temporary respite is necessary, so that it may have a chance to empty itself, frequently acting in a life-saving way, this operation should be performed. Local bleeding of the heart by puncture of the auricle with an aspirator needle should never be resorted to ; it is too dangerous.

Whittaker believes, in extreme cases of edema of the lungs or brain where death seems imminent from suffocation or coma, it may be justifiable to let blood. In old times blood was let in the quantity of several pints in twenty-four hours in the relief of these conditions, and there is no doubt of the value of venesection in these cases. In the

clinic of Liebermeister it was found that in certain cases of insufficiency and stenosis of the mitral valve, when the pulse could no longer be felt and the blood only escaped from the vein in the arm drop by drop, the discharge of 240 c.c. from both arms rendered the pulse palpable and saved the patient. Under the use of digitalis, the hydrops, the cyanosis, and the dyspnea disappeared, so that in the course of two months compensation was again restored.

HEMORRHAGE, TREATMENT.

Hemorrhage is arterial, venous, capillary, or parenchymatous. *Arterial* blood is bright crimson or vermilion in color, and issues from the divided vessel in jets. *Venous* blood is of a dark-blue tint and flows in a continuous stream. In *capillary* hemorrhage the blood is of a reddish tint and exudes from the tissues. *Parenchymatous* hemorrhage is characterized by blood of partly venous and partly arterial origin, as in the spleen. Hemorrhage may result in death at once, or syncope with depression of the heart and clot-formation, followed by reaction, and sometimes with recurrence of the hemorrhage, and death. In man, death is inevitable when an adult loses at one time one-half (4 to 6 pounds) of the total volume of blood, whereas a more considerable but gradual loss may be followed by recovery (Matas). Children are much more susceptible than adults and may die after very small hemorrhages, while women will stand the effects of

hemorrhage much better than children or men. In the aged or arteriosclerotic the dangers from acute hemorrhage are still greater.

Observations upon healthy adults have shown that a loss of about 50 c.c., corresponding to about 250 millions of red corpuscles, is immediately replaced without diminution of hemoglobin or erythrocytes out of the reserve fund of the vascular system (Arneth).

Patients recover after the persistence, for weeks and months, of less than 2,000,000 erythrocytes to the centimeter. The mere deprivation of the oxygen-carrying function of the blood usually plays no part in the causation of death from hemorrhage, and is shown in pernicious anemia with respiration apparently unaffected (Hayem and W. Hunter).

The immediate source of danger from sudden loss of blood is the fall of blood-pressure to a point at which the circulation cannot be maintained. Pilcher and Sollmann found that hemorrhage progressively stimulates, depresses, and paralyzes the vasomotor center. The period of stimulation is somewhat variable, but usually persists during a total hemorrhage of about 25 c.c. per kilogram when the blood-pressure has fallen to about 90 to 100 mm. A period of vasodilatation follows the stimulation; the perfusion flow may remain below the normal, return to normal, or increase somewhat above the normal flow. The center becomes paralyzed when about 35 to 45 c.c. per kilogram has been withdrawn and when the blood-pressure has reached a low level (approximately 30 mm.). Re-

injection of blood or saline solution before the onset of paralysis may restore the vasomotor tone. The low blood-pressure (shock) level depends chiefly on the amount of blood lost and not to an important degree on the rapidity of the hemorrhage. The relation of the fall of blood-pressure to the amount of blood lost varies in each animal; however, the median type is approached more or less closely by each experiment.

The readiest way to meet the threatened failure of circulation, after severe hemorrhage, is to replace the lost blood by intravenous infusion of normal saline. In normal animals, Pilcher and Sollmann noted that the intravenous infusion of saline solution (10 to 40 c.c. per kg.) slightly stimulates the vasomotor center or leaves it unchanged. Occasionally, when the saline causes a maintained rise in blood-pressure, there may be considerable stimulation of the center. Above a 60 mm. level, the original blood-pressure seems to have no influence on the response of the vasomotor center.

The factors that enter into the fall of blood-pressure and are the *essential cause of death in acute hemorrhage* are: The sudden anemia of the bulb, vasomotor and higher nerve-centers, which are thus crippled or inhibited, and are unable to regulate the vasomotor mechanism, and the sudden diminution in the amount of blood circulating in the blood-chambers and in the myocardium itself. "Loss of blood predisposes to shock because shock is due to a disturbance of the vasomotor mechanism, and the diminution of the fluid contained in the vessels means

an additional tax brought to bear upon the vaso-motor center in maintaining a given mean blood-pressure. Every such stress placed upon the center diminishes the total amount of functional reserve it may have."

Post-partum Hemorrhage.—Brock points out that the treatment of serious post-partum hemorrhage resolves itself into that of regurgitant venous hemorrhage, and must be carried out by one of two methods: (1) The application of direct pressure to the bleeding sinuses, after the method advocated by Dr. Herman, of introducing one hand closed into the vagina, while, with the other, the fundus of the uterus is pressed down on to it through the abdominal wall; or (2) elevation of the pelvis and compression, not of the aorta, but of the inferior vena cava, by precisely the same maneuver. He is of opinion that the method for arresting post-partum hemorrhage by compression of the aorta depends for its success on the compression, not of the aorta, but of the inferior vena cava, thus stopping the backwash of blood from the latter vessel.

Hemoptysis.—In 7 cases Broga used amyl nitrite and the hemorrhage on 15 occasions was arrested as if by magic; blood ceased to accumulate in the bronchial passages, and thus the evil effects of its decomposition is avoided. Five or six drops of amyl nitrite on a wad of cotton were inhaled, and the hemorrhage ceased at once and did not occur again in the majority. The inhalations were repeated several times afterward during the day. It proved effective, even in cases in which no other treatment

had given relief. Broga augmented the nitrite by enemas of gelatin to which calcium chloride had been added, with fluidextract of hydrastis internally. Since this method has been adopted no patient has died from hemoptysis, and whenever it appears it is controlled at once.

Campani thinks that hemoptysis is the result of a combination of unusual irritability on the part of the blood-vessels and increased blood-pressure. The conditions are approximately the same as in the menstrual molimen—temporary vascular erethism and hypertension. He advises amyl or sodium nitrite. In cases of rupture of a large vessel in the lungs, no benefit need be expected from the nitrites. In this case, ice to the chest and small pieces by mouth, opiates, and the patient placed in a sitting position proved effective.

Senator thinks lead acetate increases the viscosity and coagulating power of the blood, and occasionally uses it.

Bonney's observations on venesection are most satisfactory. Ordinarily, any attempt to reduce arterial pressure in pulmonary circulation by venesection is irrational, as the hemorrhage itself has probably already produced any good to be derived in this manner. He has found that moderate venesection does good where the initial hemorrhage has been slight, and recurs where fever has been persistent and blood-pressure high. *Venesection may do good in pulmonary tuberculosis accompanied by nephritis*, where the abnormally high blood-pressure seems to provoke and prolong the hemioptysis.

In an interesting case reported by me some years ago, I note the following:—

History.—J. B., Polish, musician, butcher, aged 29, came under my service, August 10, 1903. Family history was negative. The patient was married, had a family of five healthy children. He was addicted to the use of alcohol, but denied venereal infection. He played at Polish weddings, which kept him from sleep often for a period of two days. The patient's health was good until May, 1903. At this time a dry, hacking cough, loss of weight and strength began. On the day the patient came under my care the patient had had two copious hemorrhages. Expectoration was free and showed bacilli in abundance. Dyspnea on exertion, morning chills, evening fever, night-sweats, great emaciation, and weakness were present. The tuberculin reaction was positive; 2 mg. of tuberculin produced marked rise in temperature.

Physical examination revealed a marked exaggeration of signs showing involvement of right apex. There were no complications.

Treatment.—Morphine, $\frac{1}{4}$ gr., and atropine, $\frac{1}{100}$ gr., were administered every four hours to control the cough and sweats. I instructed that the patient receive plenty of fresh air, sunlight, oleum morrhuæ, milk, and raw eggs. When called to the patient, I found the pulse full and bounding and dyspnea intense. I immediately depleted the patient of approximately sixteen ounces of blood and had the pleasure of seeing the symptoms relieved.

Result.—December 20, 1903, patient was in normal health; had regained weight and strength. There was no cough; bacilli were absent from sputum; tuberculin test of 5 mg. was negative.

Hematemesis.—Hemorrhage from the stomach may result from traumatism, mechanic obstruction, cardiac disease, pulmonary disease, vicarious menstruation, rupture of an aneurism, ulcer of the stomach, cancer of the stomach, and irritant poisons.

The treatment is rest, rectal alimentation, cold to the epigastrium, and morphine and atropine hypodermically. Surgical intervention is oftentimes necessary.

HYPERTONIA VASORUM CEREBRI.

The etiologic factors bearing exclusively upon hypertension may be classified, according to Janeway, as functional, relatively referred to as (*a*) physiologic, pharmacologic, toxic, and (*b*) acute cerebral compression and anemia. I would suggest the addition of the psychologic factor to the above classification, because of its meaning and importance in hypertonia.

The factors in essential hypertension are (*a*) arteriosclerosis, (*b*) renal disease, and (*c*) angiosclerosis.

Any transitory cause producing on the vascular system increased blood-pressure may be spoken of as functional hypertension. The increase of tension due to excessive mental activity or physical exertion, as found in forcible inspiration in normal man, are

physiologic acts which force a large amount of blood to the heart and brain. Acute gastric and intestinal pain may cause hypertension (Curschmann). Nicotine, alcohol, ergot, adrenalin, hydrastine, hydrochlorate, and stypticin are some of the drugs which cause great increase in blood-pressure. Nicotine is one of the most destructive agencies to constructive metabolism, and should be ranked with alcohol. Toxic factors are found in eclampsia (H. Vaquez), gout, alimentary intoxication (Finkelstein), and uremia. Psychic hypertension of great intensity is seen in fright, sudden joy, and great sorrow.

Extreme high tension may accompany acute compression of the brain in fracture of the base of the skull, and in apoplexy. Acute cerebral anemia produces the same symptoms as cerebral compression; hence, high tension.

Obstruction of the cerebral sinuses and veins may be due to pressure on the innominate or jugular veins, by a tumor or aneurism, to suffocation and strangling, to excessive strain, to tricuspid insufficiency, to embolism, to thrombosis, to arterial and venous degeneration, to ulceration, to abscess, and to hemorrhage. Weinburger observed, in the case of a gardener of 36, an aneurism and rupture of the vessels, and the basilar arteries and aorta were sound. An abscess due to a mycotic embolus may result in an aneurism or rupture of the vessel.

The causative factors in essential or permanent hypertension, according to some investigators, are due to a damaged regulating power of the visceral circulation. This high level of blood-pressure must

be met by the mechanical complexity of automatic principles and is so maintained by hypertrophy of the left ventricle. Some writers (Hasenfeld, Hirsch, Janeway) assert that hypertrophy of the left ventricle is due to arteriosclerosis, only when there is disease of the splanchnic arteries, or in the aorta above the diaphragm. Thus they exclude all other parts of the vascular system.

The hypertension of renal disease is a marked condition, concerning which many theories have been advanced. Bright, in 1836, first associated lesions of the kidney with a hypertrophied heart. He thought the causative agent to be irritants in the blood stimulating the heart abnormally or increasing the resistance of arteries and capillaries. Schlayer relates observations in this line, stating: "There is no relation between hypertension of nephritis and the functioning of the suprarenals." The hypotheses of Bright and other observers (Traube, Johnson, Gull and Sutton, Cohnheim) all have the essence of truth as deduced from clinical evidence. The cold facts presented to us resolve the etiology of cardiac hypertrophy and renal disease into mechanical processes and pathologic sequences.

In a given case of irritation of the vascular supply of the kidneys, we have, at first, hyperemia; and such being the case, faulty elimination of waste products, and a blood overloaded with toxins; then intensified inflammation of the kidneys, increased amount of blood through ingestion (as the persistent imbibing of large quantities of beer), vasomotor spasm, high arterial tension, chronic inflammation,

sclerosis, heart exertion, and hypertrophy follow. Janeway claims: "Increased resistance and diminished splanchnic compensation are essential hypotheses for the comprehension of arterial tension in the light of present knowledge, whatever the source of the irritant which provokes them." The splanchnic circulation may cover a multitude of sins, but, in my opinion, not that of arterial tension.

The production of nephritic types in the rabbit and dog by injections of turpentine, phenol, lead, mercury, or other irritants, or exposure to cold, elucidates step by step the pathologic alterations in the kidney structure. I have observed that the clinical course in the human organism is analogous to that of the dog and rabbit so closely that I am forced to believe my hypotheses correct.

I am convinced of the great influence of the nervous supply upon the vascular system as a whole or in part. Bishop believes that the cause of hypertonia vasorum is of nervous origin. Sclerosis or angiosclerosis seems to me to be due to failure of the vessels to compensate for the increased work induced by etiologic agencies. Thus we should recognize this most important factor in sclerotic arteries, as well as in other pathologic conditions in any part of the vascular system.

I shall not confine myself further to the causative agencies of hypertension of the whole vascular system, but to symptoms, and the effects of vascular hypertension on the brain. The symptoms of irritation are: oppressive headache, which is sometimes pulsating and aggravated by physical and mental

effort, the sign of painful thought (Josué), vertigo, irritability, rapid pulse, epistaxis, restlessness, insomnia, and nervous phenomena as flashes of light, hyperacusis, transient tingling or heaviness of arms or legs, sometimes intense persistent neuralgias, and convulsive movements. The depressive symptoms are manifested by the obtunding of the senses. The anemia of the brain may be sudden, with pallor, weakness, vertigo, headache, flashes of light, subjective noises, rapid respiration, cool skin, and, in extreme cases, coma, convulsions, and death. If the onset is slow, there is somnolence, dullness, apathy, insomnia, headache, vertigo, tinnitus aurium, and *muscæ volitantes*. An attack of apoplexy may be sudden, with unconsciousness, conjugate deviation, loss of motor power, loss of sensation, and, perhaps, coma and death. Possibly headache, depression, choreiform movements, more or less paresthesia, may precede the attack.

The general symptoms may begin with a feeling of fullness in the neck and temples due to hypertension of the cerebral blood-vessels. Tremor is present in a goodly number of cases.

The temporal and occipital headaches are generally the result of spasm of locally affected or diseased vessels, and are not of absolute diagnostic value, but should be carefully noted in their association with other factors.

Vertigo is due to disturbed cranial circulation. Slight or spasmodic dyspnea, following errors of diet, is an important sign. Flashes of light, restlessness, insomnia, convulsive movements, and irrita-

bility are the result of the action of the hypertonic vessels on cerebrocellular repose. Depression or obtunding of the senses is due to anemia of the part, or pressure acting on the convolutions, which, when intensified, produces unconsciousness.

Generally, if the patient has not been under the care of an observant physician, he is not aware of any serious condition. He goes about his usual vocation until he is suddenly attacked, without warning; but some of the above symptoms may have preceded the attack. The sequence of the condition may be cerebral hemorrhage and its results: aneurism, embolism, thrombosis, encephalitis, anemia from pressure, edema, hyperemia, artery block, and death, delayed or sudden.

The course and termination of hypertonia of the cerebral vessels are inevitably governed by the gravity of the disease and the accuracy of the treatment.

To distinguish hypertension of the cerebral vessels from other conditions is, at times, quite difficult. It differs from acute alcoholism in so far as there are no pressure symptoms, or organic brain involvement. Opium poisoning is readily recognized by the pinpoint pupil, slow pulse, and respiration. Uremia is generally cleared up by the history of the case. Syncope is a symptom of circulatory failure and the duration of unconsciousness short. Cerebral embolism, apoplexy (a name that is applied to anything which produces a certain line of symptoms), thrombosis, aneurism, and artery block are the sequences of, or associated with, hypertension of the cerebral

vessels, and confront us with one of the most difficult and delusive problems found in the diagnostics of internal medicine. The greatest importance attaches to correct diagnosis, for without it we are void of an accurate plan of treatment.

Artery-block, a momentous condition in the study of hypertonia, may account for the source of a great deal of error in diagnosis. Many thousand sudden deaths occur yearly, which are erroneously imputed to heart, brain, or kidney disease; but, in fact, are pure and simple cases of artery block. The post-mortem examination reveals no lesion of the above-named organs other than the condition of the vessels as a result of the block.

The block may be due to an active or passive hypertonic state of the cerebral vessels:—

Active, such as increased cardiac action; excessive ingestion of food or drink; acute alcoholism; general plethora; sunstroke; prolonged mental exertion; diminished blood-supply to other parts of the body resulting from ligation of a large artery, or disturbance of the splanchnic circulation.

Passive, due to dilatation of the right heart, or pressure on the veins returning the cerebral flow of blood.

Spasms of the cerebral vessels, which may be toxic, tonic, or clonic, produce artery block and its possible sequences: Aneurism, apoplexy, thrombosis, embolism, or capillary hemorrhage, any of which may cause death.

I have long held the hypothesis that epilepsy is the sequel of an *angioneurotic artery stenosis*, or

disturbance of the circulation of the convolutions, *producing, in accordance with the intensity of the spasm, le petit mal, or le grand mal.* The foregoing hypothesis is not founded upon mere supposition, but upon clinical evidence presented by 52 cases cured by regulation of the circulation. L. Clark, in *The Lancet*, London attributes epileptoid attacks in tachycardia and bradycardia to withheld nutrition of the brain, without reference to sudden change in the blood-pressure in the cerebral vessels. In support of this theory, he cites Langerdorf's experiments in 1878. I think that recent experiments tend to show plainly the relation of artery block to epilepsy.

The use of the sphygmomanometer (Riva Rocci or modification) is of immense practical utility, for on its use great issues depend. All systolic and diastolic determinations should be made with the patient in the recumbent position. The pulse stability should be carefully measured. Tactile estimation of blood-pressure should be made of every accessible artery. The peripheral and venous circulation should be especially noted. The tympanic membrane will oftentimes show incipient signs of high tension.

The ophthalmoscope should ever be kept in mind, as the eye frequently presents the first proof of hypertension of the cerebral vessels. Jackson asserts that the members of the medical profession at large do not appreciate the use of the ophthalmoscope in studying vascular lesions of the retina. With this statement I heartily agree. Several observers (Ben-

son, Hartridge, de Schweinitz, Zentmayer) have reported cases of transient blindness, during which the retinal artery was temporarily empty, soon re-filling and becoming normal in appearance.

I have in another part of this work mentioned the occurrence of spasms of the arteries causing complete loss of function for a time. In this retinal picture of arteriospasm, we have the explanation of visual and sensory disturbances, and other important pathologic conditions. A distinct homonymous defect may be the first evidence of organic disease. I will state further, by way of delineation, that the ophthalmic artery coming from the carotid within the skull, and orbital veins emptying into the cavernous sinuses, disease or injury within the cranial cavity, is often manifest chiefly through disturbances of the circulation within the orbit.

The prognosis in mild cases, uncomplicated with kidney, heart, or arterial disease, is good. Simon's case exemplifies that recovery is possible in the case of red granular kidney when blood-pressure is reduced. Severe cases arising from the disease of the heart, arteries, or kidneys may terminate favorably, provided proper treatment is instituted early, otherwise the prognosis is grave.

The treatment of hypertension of the cerebral vessels includes, in part, the whole vascular system, but should be governed, mainly, by the etiologic factors.

The diet is one of the paramount factors in the treatment of this condition. All meats should be excluded,—at least, until the disease is greatly

mitigated. A vegetable diet should be adhered to almost exclusively, allowing moderate amounts of carbohydrates. The quantity of liquids must be restricted to distilled or mildly alkaline waters, whey, sour or skimmed milk, or buttermilk. Whey and sour milk are the most salutary articles of diet which we have at our command in the treatment of blood-pressure disease. Tea, coffee, and alcoholics should be absolutely avoided. The amount of condiments should be reduced to a minimum. Tobacco in any form is particularly deleterious in all cases of high tension.

Whatever the cause of high tension may be, complete mental and physical rest should be enforced,—at least, until there is marked improvement. Then the periods of absolute rest may vary from two to three times a week, or until the usual routine may be again resumed. When allowable, moderate systematic exercise should be taken before meals. Massage is beneficial when properly applied; it stimulates peripheral circulation and promotes waste elimination. Tepid baths in a warm room, followed by a brisk rub with a rough towel, aid in stimulating the peripheral circulation. The Schott method is admirably adapted to this class of diseases.

Electricity may be used, and in some cases has given very good results. Electric light has a salutary effect on the peripheral vessels. Vibration has a tendency toward vasomotor dilatation, and is especially active upon the splanchnic circulation.

In my cases, unless there are reasons to suspect immediate danger, I begin drug treatment by the

administration of calomel 2 gr. at bedtime and a Seidlitz powder before breakfast. This I continue for one week, and repeat at such times as I deem necessary. Potassium iodide 3 gr. is given three times daily and gradually increased to physiologic effect, and then reduced to 5 gr. combined with 3 gtt. Fowler's solution, which is given three times a day after meals. This reduces the viscosity and has an antidotal effect on certain irritants in the blood.

The potassium element is highly irritant to kidney tissue, and it is not advisable to continue its use for any great length of time. I have had patients, however, whose condition improved much better on potassium iodide than on sodium iodide, which was no doubt due to a special selection for certain irritants in the blood. Iodipin (10 per cent.) one teaspoonful *t. i. d.* is excellently adapted for sclerotic conditions. Biniodide of mercury $\frac{1}{20}$ gr. three times daily acts well in some cases, especially if there is a luetic history. Nitroglycerin is a powerful and a reliable drug in hypertension. It should be administered on the tongue in $\frac{1}{250}$ -gr. doses every thirty minutes until tension is lowered; then three or four times daily. Aconite in 4-drop doses three or four times daily is valuable, but will not admit of continued use. Sodium nitrate is beneficial. The theobromine and caffeine group of diuretics can be efficiently used, or supplemented by digitalis, squills, potassium citrate, apocynum, and jalap as indicated.

The value of venesection in hypertension has been fully discussed in my papers on "Venesection:

Its Therapeutic Value," published January, 1907,¹ and "Blood-pressure in the Practice of Medicine," published April, 1908.² Kottman has confirmed my investigations concerning the effect of venesection on the viscosity of the blood. He states that venesection reduces the viscosity of the blood, which reduction may last for twenty-one days. In some of my cases, the attenuated viscosity lasted for forty-five days. Venesection scientifically applied is a most valuable agent in blood-pressure treatment.

I advise all my patients who may be subject to hypertonia, to carry 3 gtt. pearls of amyl nitrite to be used in an emergency. Erythrol tetranitrite is a drug of immense practical value. The dose is $\frac{1}{2}$ to 1 gr. The dosage should be small and frequently repeated.

The establishment of collateral circulation for the relief of high tension should not be forgotten.

I have tried to suggest the enormous importance of these vascular conditions that are so frequently encountered and that may be so readily studied by those who use the apparatus for measuring blood-pressure.

The usual arrangement of the subject-matter has been somewhat departed from, though I have given a description of hypertonia with the intention of providing one complete picture of the condition. In my opinion, the arrangement facilitates a clearer comprehension of the subject, since it outlines in full and avoids repetitions and complications.

¹ American Jour. Clin. Medicine.

² Medical Record.

It may be the height of folly to deviate from the beaten path of conservatism in the endeavor to inaugurate a new name for a condition that includes a multitude of symptoms which have been heretofore designated as distinct diseases. The additions to medical literature are great, and any syndrome calls forth a new disease and necessarily a large medical name, until we have nomenclature *ad infinitum*. When we look into the condition fairly and squarely, we find a symptom and not a disease. It may be argued that it is a difficult matter so to do, but we are aware of many so-called diseases that may be classified with their variable phenomena under one head. In so doing we save time and labor, curtail nomenclature, and are enabled to concentrate our mind and energy on the conditions of essential importance. Thus the physician will be enabled to scientifically treat his patients, empiricism in blood-pressure disease will be ancient history, and therapeutic accuracy a certainty of the present.

It has been seven years since the first publication of my paper on this subject, "Hypertonia Vasorum Cerebri." During this time many new theories have been advanced in regard to the etiology of diseases of the cerebral arteries. The improvement of methods for the study of arterial disease has been decidedly marked.

The mortality rate from diseased cerebral vessels is steadily increasing. This increase is general throughout the United States and is, apparently, unaffected by climatic conditions, locality, or density of population. The correlated conditions, heart,

and chronic Bright's disease, show a corresponding increase in the mortality. The general death rate is steadily increasing. It is altogether fitting that I again discuss the subject in the light of our present knowledge.

The commonly accepted cause of cerebral affections cannot be held responsible for the increased death rate without further study of their etiology. The etiologic factors encompass ethnologic, biologic, and pathologic problems. These cannot be treated at length in this work.

The continual evolution in our social life tends to overtax the systems of men both physically and mentally. Commercial life is at a higher degree of development than at any time in the world's history. The wheels of mighty industries and progressive governments must be kept turning to maintain this high standard. The nucleus of all this activity is the human organism. It labors night and day to uphold the abstract while the concrete form is gradually sapped of its being.

These conditions slowly evolve biologic, pathologic, and ethnologic change. The effect produced by high-strung nervous tension induced by modern methods of social and business competition must be regarded as a causative factor in the production of functional and ultimately organic diseases of the cerebral vessels.

The factors in essential hypertension are (*a*) arteriosclerosis, (*b*) renal disease, and (*c*) angiosclerosis.

Any transitory cause producing on the vascular

system increased blood-pressure may be spoken of as functional hypertension. The increase of tension due to excessive mental activity or physical exertion, as found in forcible inspiration in normal man, are physiologic acts which force a large amount of blood to the heart and brain. Increase in the viscosity of the blood impedes the circulation of the blood through the capillaries (Russell), and hence high tension. Acute gastric and intestinal pain may cause hypertension (Curschmann). Nicotine, alcohol, ergot, adrenalin, hydrastine hydrochlorate, and stypticin are among the drugs which cause increase in blood-pressure. Nicotine and pyridinè are two of the most destructive agencies to constructive metabolism in the arteries of the brain and should be ranked with alcohol. Toxic factors are found in eclampsia (H. Vaquez), gout, alimentary intoxication, bacteremias, and uremia. Psychic hypertension of great intensity is seen in fright, anger, sudden joy, and great sorrow.

I have long held the hypothesis that epilepsy is the sequel of an angioneurotic arteriostenosis, or disturbance of the circulation of the convolutions, producing, in accordance with the intensity of the spasm, *le petit mal* or *le grand mal*. The foregoing hypothesis is not founded upon mere supposition, but upon clinical evidence presented by 184 cases cured by the regulation of the circulation. L. Clark, in *The Lancet*, London, attributes epileptoid attacks in tachycardia and bradycardia to withheld nutrition of the brain, without reference to the sudden change in the blood-pressure in the cerebral vessels.

The medical profession has before it an opportunity of great vital moment in teaching the doctrine of right living, advocating a saner and more wholesome attitude toward life and standing as a unit against false standards of material gain and advancement obtained by the sacrifice of normal, healthful, and peaceful attributes of calm mental poise, equable temperament, and physical well-being (Darlington).

Such conditions begin to change the ethnologic field. The instillation of new blood, or the intermingling of races, is prerequisite to the building up of a people suffering from physical and mental degeneracy. The study of structure, life, growth, and action of the human organism under various conditions gives us an insight to the highest as well as the lowest possibilities of man.

I believe, were it not for the continual instillation of domestic and foreign peasant blood into our commercial and professional life, that in one hundred years our true Americans would become extinct, due to heart and arterial disease.

Focal anemia, which may be mistaken for a hemorrhage, calls for the administration of belladonna and its alkaloid, atropine, or stramonium, or valerian. Feeble circulation and a tendency to slight hypertonic contraction require the administration of a pill containing iron and digitalis, and a mixture of spirit of nitrous ether in each dose. When the radials are slightly hypertonic, pulse feeble, and heart-sounds faint, liquor strychninæ and tincture of squill are indicated. In a pseudo-hemiplegia with a pulse of 60 to 70, artery somewhat thickened, blood-pressure

160-170 (Oliver), $\frac{1}{2}$ grain of erythrol tetranitrate, 5 minims of digitalis, suitable doses of potassium iodide, three times daily. After one week stop the erythrol and continue potassium iodide with 5 minims liquor strychninæ hydrochloridi, three times daily.

Recurring mental or motor phenomena due to cerebral arterial disease in the aged call for potassium iodide for hypertonia. Paraldehyde and low diet are also indicated. Insomnia may be treated by sulphonal, trional, veronal, or phenacetin.

A merchant of 64 came under my service July 19, 1915. Family history good. He stated that he had never been sick a day in his life until the present illness, which began about six months ago. His condition had been diagnosed "heart disease" and he was confined to bed the greater part of the day.

Examination of heart and lungs showed them to be apparently healthy. Arteries slightly hypertonic and somewhat thickened. The tongue was coated, but moist; the appetite good; bowels moved daily. After eating there was flatulence and the patient became dizzy, unstable, apprehensive, and complained of a fullness in the head. He had no headache at any time. He had a rapid, high-tension pulse and a blood-pressure of 160 mm. Hg. The vision was good. The urine contained no albumin or sugar. Bile and indican were present. This, no doubt, was a case of atonic dyspepsia, which caused a hypertonia because of the irritants in the blood.

It is in these cases that we often get apoplexy or paralysis, either by complete rupture or aneurism of a cerebral vessel. There had been an attempt on

the part of the attending physician to get rid of the circulatory irritant by purgatives and diuretics. In this case, the poison was concentrated in the circulation by such measures. In view of this fact the patient was bled twenty ounces and 10 ounces of saline given. This was repeated in two weeks, and milk of magnesia, 2 drams, one hour before meals; 1 pint of water directly before meals; 15 gr. charcoal and sodium bicarbonate, 10 gr., one hour after meals were administered. This was continued one month, then alternated with potassium iodide, 15 gr.

November 1, 1915, the patient's blood-pressure was 140 and his general condition very good. Feb. 1, 1916, the patient was actively engaged in business.

A milliner of 36 came under my service August 3, 1915. Healthy until 12, when she was injured on right side. Ovarian and womb trouble at 26. At 34 had hemorrhage of left eye, which necessitated its removal. Scanty menstruation, intense headache, extremely nervous, constipation, heart rapid, and accentuated second sound. Arteries tense, but not sclerotic. Blood-pressure 145 mm. Hg.; urine highly colored, acid in reaction, sp. gr. 1025; large amount of indican. Congestion of right eye and intense pain.

Patient depleted of sixteen ounces of blood. Calomel, podophyllin, and soda at bedtime and Seidlitz powder before breakfast each day for one week. One week rest, another depletion of twelve ounces, and KI 15 grains, with 3 drops Fowler's solution, *t. i. d. p. c.*, and glonoin $\frac{1}{100}$ gr. every three hours, were administered. Three months later

dilatation of cervix and the administration of luteum, 5 grains, was followed by rapid recovery.

LIVER DISEASES.

Antiphlogistic measures for inducing a cutaneous hyperemia or inflammation, as vesicants, cauterization, leeches, wet cups, and hot mustard poultices, in order to compensate for the hyperemic or inflammatory condition of the liver, are often prescribed as a matter of routine practice. Puncturing of the liver with a small trocar or aspirator is bad practice.

The most efficacious and absolutely innocuous methods of lessening hepatic congestion at our disposal are small anal bleeding and intestinal derivation. The relation which exists between the inferior hemorrhoidal veins and the portal system permits of our depleting the latter by applying leeches to the anal orifice. This procedure meets with great success in many cases of hepatic affection, especially in acute hyperemias. But it is not a form of treatment which can be applied daily, since it would bring on a condition of anemia, which must be avoided. We must, therefore, resort to intestinal derivation by means of saline purgatives, which have a true dialytic action, and, by producing a marked serous transudation into the lumen of the intestines from the small venous radicles, cause a depletion of the portal system, and thus diminish the flow of blood to the liver (Semmola and Gioffredi).

LUNGS, ACUTE CONGESTION.

An increase in, or abnormal fullness of, the capillaries of the air-cells: *active*, when the result of an accelerated circulation; *passive*, when caused by an impeded outflow from the capillaries. It may be due to irritant vapors, exposure to cold atmosphere, burns, cerebral lesions, and infectious fevers.

The symptoms are in harmony with the severity and the extent of the hyperemia. Dyspnea, cough, pain in the side, oftentimes expectoration streaked with blood, may exist.

Forchheimer maintains that the question of phlebotomy is the same as in the treatment of pneumonia; in healthy, strong, full-blooded individuals it accomplishes much good. When phlebotomy is not permissible wet cups may be used; these combine the effects of peripheral stimulation with those of bloodletting.

The treatment of congestion of the lungs is usually that of the condition with which it is associated. In the intense pulmonary engorgement, which may possibly occur primarily, and which is met with in heart disease and emphysema, free bleeding should be practised. From twenty to thirty ounces of blood should be taken from the arm, and if the blood does not flow freely and the condition of the patient is desperate, aspiration of the right auricle may be performed (Osler).

LUNGS, EDEMA.

An exudation of serum into the pulmonary interstitial tissue and the alveoli of the lungs, characterized by dyspnea, cough, and a frothy, blood-streaked expectoration. It may be due to heart disease, infections, Bright's disease, alcoholic excesses, pregnancy, and angioneurotic edema.

The onset is sudden, with a feeling of oppression and pain in the chest and rapid breathing, which soon becomes dyspneic or orthopneic. Diffused subcrepitant and bubbling râles are heard over the entire chest; the face is first flushed, later cyanosed; oppression and anxiety are extreme; and shallow breathing, feeble pulse, and coma supervene.

The prognosis is grave and the affection usually comes on as a terminal symptom in acute and chronic diseases.

Dieulafoy insists that the urgent indication in the treatment of this condition is bleeding. In spite of the coldness of the patient and the threatened collapse, which would at first appear as contraindications, there must be no delay, and, without losing an instant, ten to fifteen ounces of blood must be withdrawn. The marvellous results of bleeding must have been seen to make its importance clear. He does not exaggerate in saying that it produces in the patient a visible change. In a case at the Necker Hospital edema came on with such rapidity that death would have speedily followed unless bleeding had been performed at once. The patient, who had not lost consciousness, told us that he felt

himself dying and recovering in the space of a few minutes. In his patient at the Hôtel-Dieu blood-letting had such a marvellous result that imminent death was arrested, and the râles which filled the chest from apex to base disappeared as by magic, leaving only a residue at the bases. Bleeding gave a similar result in Giraudeau's case.

Of all the methods of bloodletting bleeding is, without doubt, the most favorable; but, in default of bleeding, wet cupping over the chest may be made, or, still better, two dozen leeches may be applied. Dry cupping of the thorax and of the limbs is also useful.

Subcutaneous injections of caffeine or ether are often indicated. We must remember, however, that the kidneys are inactive, and therefore use caffeine with caution. We may start with an injection of a grain, and be ready to repeat it several times during the following hours. Oxygen in large doses may also render service. The patient's strength must be supported by milk and weak tea, with a little alcohol.

MENINGITIS, CEREBROSPINAL.

An infectious disease, occurring sporadically and in epidemics, caused by the *Diplococcus intracellularis*, characterized by inflammation of the cerebrospinal meninges and a clinical course of great irregularity.

The onset of cerebrospinal meningitis is generally sudden and febrile, with or without rigors,

headache, somnolence, spasms of muscles, and feeble pulse. Usually a purpuric rash develops. There are many forms and the symptoms vary accordingly.

The treatment of cerebrospinal meningitis is the more important, in that we are dealing with a disease which is often curable. It is to be hoped that we have found a therapeutic means in Flexner's serum. It should be given as early as possible in the course and also in doubtful cases. Whenever the fluid obtained by lumbar puncture is purulent the serum should be given, but repeated only if the meningococcus is found. Injections (30 c.c.) should be given daily as long as the diplococci are found in the cerebrospinal fluid.

The patient should be kept as quiet as possible, handled gently, and all cases of irritation removed. Hot baths to the body and ice to the head. The bowels should be opened by a calomel and saline purge, and laxatives and enemata later if necessary. The diet should be liquid and plentiful. The administration of hexamethylenamine, 60 grains a day, is worth a trial (Osler).

Headache and the delirium must be treated by bleeding, leeches behind the ears and on the nape of the neck, and wet cups to the spine. Intravenous injections of collargol may be given. Antispasmodic remedies, as chloral, sulphonal, and morphine, may be administered.

In discussion of cerebrospinal meningitis, A. Netter says that bloodletting, narcotics, calomel, blisters, applications of ice, and quinine have all been proposed in the treatment of cerebrospinal

meningitis, and each of them has its advocates and its adversaries.

Bloodletting was naturally frequently employed at the time when cerebrospinal meningitis first appeared in France, because at that period the antiphlogistic method of treatment was at its apogee. Faure Villars claimed to have obtained very satisfactory results, and he believed that when phlebotomy was resorted to at the beginning of the disease it would abort it. But in order to obtain this result it was necessary, he held, to abstract a large quantity of blood, even to the point of inducing syncope. In addition to the phlebotomy the physicians of that time resorted to wet cupping and the applications of leeches to the temples, back of the neck, and along the spine.

MENOPAUSE.

The menopause is that epoch in the life of the human female when she ceases to menstruate and bear children (Ashton). This usually occurs between the fortieth and fiftieth years. It is attended by disturbance of digestion, flushes of heat, nervous derangements, and the appearance of presbyopic symptoms.

The treatment is dietetic, hygienic, and symptomatic. There are two critical epochs—puberty and menopause—in a woman's life, and with good reason. The mental disturbances, sexual aberrations, constitutional dyscrasias, the effects of child-bearing, celibacy, etc., that are apt to appear at this time require the tenderest care and patience on the

part of the woman's family and the watchful attention of her medical adviser.

Low diet, saline purgatives, stimulating tonics, hydrotherapy, and sedatives, in nervous conditions, are quite necessary. For the severe headaches, leeches to the temple, mastoid, and occiput are of service. For plethora, venesection is valuable, and more especially if the menstrual flow suddenly stops.

A housewife of 48, referred to me by Dr. W. A. Wall, came under my service November 18, 1915. Family history good. She had had the diseases of childhood, including mumps. Had typhoid fever twenty years ago, malaria eight years ago, and two years ago had a nervous breakdown.

The present symptoms began two months ago, after menstruating ten days, and she has not menstruated since that time. The patient is weak and nervous, at times bordering on acute mania; complains of an all-gone feeling, faintness, headache, sharp and shooting pains in temples, palpitation, and numbness of arms and hands. Is apprehensive, has insomnia and flatulence, with constipation. The urine is highly colored, acid in reaction, sp. gr. 1025, bile and indican in large amounts; no albumin, sugar, or casts. Blood color-index high, apparently due to intense toxemia. Blood-pressure 165 mm. Hg.

The diagnosis was *hypertonia vasorum cerebri*, due to sudden cessation of menstruation. In other words, caused by the accumulation in the system of toxins that normally should be eliminated by the menstrual flow.

The ordinary measures to remedy this condition were employed by her family physician, yet she became gradually worse. Hence, she was referred to the surgeon and he, thanks to a proper diagnosis, referred her to me.

The patient was bled thirty-two ounces and 20 ounces of Loeb's solution injected intravenously. The citrate of iron, arsenic, and strychnine was given hypodermically. Cascara, senna, and rhubarb was given for constipation. Meat was proscribed and a salt-free diet prescribed. Large amounts of whey, buttermilk, and skimmed milk were advised, together with the usual prophylactic precautions.

The patient made a good recovery. Blood-pressure, January 31, 1916, was 135 mm. Hg. Venesection, in this case, undoubtedly relieved the patient of the sequelæ incident to a stormy menopause.

MENOPAUSE, ARTIFICIAL.

A housewife of 47 came under my service December 20, 1915. The family history was good. The patient had diphtheria, measles, and whooping-cough in childhood. She menstruated at 11 years of age. The menstruation was regular and painful. She married early and had six miscarriages. The patient was operated on two years ago by Dr. X. O. Werder for removal of uterus and tubes.

The present symptoms began October, 1914, with persistent pain in both knees, sometimes sharp and lancinated, with swelling. She com-

plains of persistent pain in temples and nape of neck. The heart was somewhat enlarged. The lungs were apparently normal; urine pale, highly acid, and sp. gr. 1020. Bile and indican were present. Blood-pressure 140 mm. Hg.

The salicylates were administered internally in combination with sodium bicarbonate. The diet was regulated. Local applications of ichthyol, belladonna, and oil of gaultheria in lanolin were applied to joints. Later corpus-luteum extract was given. None of the above was effective. Believing that venesection would do no harm, the patient was bled sixteen ounces and 12 ounces of Adler's solution injected intravenously. Then the above remedies were given with excellent results. Subsequently the following prescription was given instead of the above:—

R̄ Acidi arseniosi gr. $\frac{1}{30}$;
 Ferri sulphatis ex. gr. iij;
 Corpus-luteum extract gr. v;
 Phenolthaleini gr. iij.

M. et ft. cap. no. j.

Sig.: One capsule three times daily, *p. c.*

The patient has much improved, and, I believe, will make a good recovery.

MIGRAINE.

Hemicrania; megrim; sick-headache; bilious headache; blind headache. A paroxysmal affection characterized by severe headache, usually unilateral, and often associated with disorders of vision. Möbius claims that heredity plays an important rôle

in 90 per cent. of cases. The nature of the disease is unknown, but toxemia, vasomotor disturbance, affection of reflex origin, and transient plugging of the foramen of Monroe have been given as probable causes.

The unilateral pain in the head is usually accompanied by nausea, often vomiting, intolerance of light and sound, and incapability of mental exertion, the brain for the time being temporarily prostrated and disturbed. The affection usually develops before the age of 25, and is free from danger to life.

The exciting cause should be ascertained and the treatment should be directed toward it. During the attack, morphine (gr. $\frac{1}{4}$ hypodermically) with atropine (gr. $\frac{1}{120}$), and the fluidextract of cannabis indica (gtt. 2-3 every half-hour) have been used with great benefit. Menthol pencils used locally ease pain. Dieulafoy advocates hydrotherapy and the bromides as the most efficacious in treatment. Early free purgation is said to ameliorate the attack (Hare). The use of nitroerythrol, sodium nitrite, and amyl nitrite has been recommended (Brunton).

It has been my practice to advise a saline purgative, followed by a hot mustard foot-bath, and a glass of hot milk, to which is added the following:—

Chloralis hydratis,
Sodii bromidiãã gr. xx;
Ext. cannabis ind.,
Ext. hyoscyamiãã gr. $\frac{1}{4}$.

This will bridge over the attack with twilight slumber.

The application of leeches to the temple, mastoid, and to the nape of the neck, or general blood-letting have proved very satisfactory in my cases.

CASE 26.—G. P. F. W., male, aged 45, merchant, had always enjoyed good health except that he "had the trouble with head since childhood." He stated that mother had same trouble; hence, we may infer that the trouble was hereditary.

Clinical History.—A few days preceding an attack the patient complained of a feeling of heaviness over the eyes, indigestion, and mental depression. The attack was generally ushered in by chilliness, nausea, intolerance of light, ringing in the ears, vertigo, intense pain extending over left side of head. Sound greatly irritated patient. There was at times disturbance of the circulation. The disease was much aggravated by domestic trouble.

Treatment.—Mentholated pencils, cannabis indica, gelsemium, morphine and atropine, caffeine citrate, monobromate of camphor, etc., were used, alone and combined, to no effect. Fourteen ounces of blood were withdrawn from median basilic and condition was relieved. Six months afterward the patient began to have attacks, and sixteen ounces were abstracted. The patient was under observation for two years and had no recurrence of the attack.

I am inclined to the hypothesis of Lauder Brunton, that migraine is an angioneurotic condition in which there is *peripheral contraction and central dilatation* of the arteries. From my own observa-

tions, I would infer that the condition is due to toxemia.



Diagram of the carotid, temporal, and occipital arteries in the normal state. (After Brunton.)



Diagram of arteries during migraine, showing dilatation of the carotid and spasmodic contractions of the temporal arteries. (After Brunton.)



Diagram of arteries during migraine, showing dilatation of the carotid and temporal arteries, and spasmodic contraction of an ascending frontal branch of the anterior temporal artery. (After Brunton.)

MYALGIA.

A painful affection of the voluntary muscles and of the fascia and periosteum to which they are attached. It is probable that in many cases the fibrous tissue is especially affected—a fibrositis. It is by no means certain that the muscular tissues are the seat of the disease. Many writers claim in some cases it is a neuralgia of the sensory nerves of the muscles. The affection has received various names, according to its seat, as torticollis, lumbago, pleurodynia, etc.

The attacks follow cold and exposure, and trauma is often a factor. It is usually acute, but may become subacute or even chronic, the last being more common in later life.

Rest of the affected muscles is of the first importance, and it is well to protect them from cold by a covering of flannel. Strapping of the side in pleurodynia, and if the pain is severe a hypodermic of morphine, gives immediate relief. For lumbago, ironing, dry-cupping, or acupuncture, in acute cases, is efficient. The high-frequency current, blisters, actual cautery, injections of sterile water (Potain and Dieulafoy), and epidural injections have their indications. Superheated air and sprays of ethyl chloride have achieved many successes. The bowels should be opened freely by calomel and saline purges. The salicyl compounds, colchicum, and potassium iodide have been highly recommended. At the outset a Turkish bath, with quinine and Dover's powder, at bedtime may cut short the attack. Bleeding,

leeches, and cupping are useful. Beaumetz obtains mild revulsion by applications of iodine or by punctate cauterization.

NEPHRITIS, ACUTE.

Acute diffuse nephritis is a condition of the kidneys due to the action of cold or of toxic agents.

In all instances changes exist in the epithelial, vascular, and intertubular tissues, which vary in intensity in different forms; hence writers have described a tubular, a glomerular, and an acute interstitial nephritis. Delafield recognizes *acute exudative* and *acute productive* forms, the latter characterized by proliferation of the connective-tissue stroma and of the cells of the Malpighian tufts (Osler).

The *causes* of acute nephritis are numerous and varied. Toxi-infectious diseases, drugs, autointoxication, pregnancy, and cold are the principal causes.

When the nephritis is severe, the onset is violent. The patient may have rigors, fever, and lumbar pains; the urine is scanty, highly colored, and contains blood, albumin, and casts. Edema appears early. The anasarca commences, as a rule, in the face, which is pale and swollen, and in a few days invades the lower limbs and the various regions rich in loose cellular tissue, such as the eyelids, the scrotum, the prepuce, and the labia majora. The edema is soft, white, and pits readily. Ofttimes edema and dyspnea, with or without vomiting, are the only signs of nephritis, and even then the onset

of the disease is not clear. The specific gravity of the urine is high—1.025, or even more. The amount passed may be reduced to only five or six ounces. The albumin is abundant and urea diminished.

The symptom-complex of uremia may appear in a few days or a few weeks. Ocular changes should be looked for at any time during the course of the disease.

The *treatment of acute nephritis* consists in rest in bed, milk diet, plenty of alkaline mineral water, thin flannel underwear, free evacuation of the bowels, cupping of the loins, and general blood-letting in the case of uremic symptoms. Hydrotherapy in the form of hot bath, wet pack, or the hot-air bath is often efficient in the treatment of the dropsy.

Prof. A. Robin recommends, in the treatment of acute nephritis or edema of the kidney, that blood-letting be resorted to in the acute stage. Milk and infusions, he states, only *tend to stimulate an organ which cannot work*. Instead of stimulating the function of a diseased gland, the smallest possible amount of work should be given to it. The patient should be permitted to drink only as much water as will relieve his thirst.

Bacelli treats acute nephritis by withdrawing 200 c.c. of blood from a vein in the foot. In a typical case described in the *Policlinico*, xiv, 18, 1907, the edema of the lids, fever, blood, albumin and casts in the urine indicated severe nephritis a few days after the stormy onset. The trouble in the kidneys *causes lower arterial pressure* and increased venous stasis

and thrombosis in the finer ramifications of the veins with the glomeruli compressed and paralyzed. Venesection relieves these conditions as if by magic, and nature then has a chance to heal. In the severer cases he follows the venesection with powders containing sodium sulphate, sodium nitrate, and scammony, every five minutes. This stimulates the emunctories very powerfully, but the venesection alone generally aborts the nephritis and prevents its transformation into a chronic phase. In the severe acute case described, the venesection was repeated the second day and recovery was soon complete.

Dieulafoy advises bloodletting when symptoms of uremia, epileptiform convulsions, delirium or coma develop. In this case ten to twenty ounces of blood must be withdrawn, and the operation repeated, if necessary. This measure is most valuable, and must never be put off. Many cases of acute nephritis and grave uremia owe their recovery to free bleeding. Dieulafoy is so convinced of its efficacy in acute nephritis, that he would advise it in cases of moderate severity. Bloodletting has not only an immediate action on the acute symptoms at the moment, but he believes that it diminishes the risk of subsequent mischief.

Injections of *serum* and *all foods containing salt* must be avoided. The milk diet must be strictly adhered to for several weeks after the supposed cure.

OBESITY.

A disorder of metabolism characterized by excessive deposit of fat in the body (Osler).

Obesity is a disease of all ages, more frequent in adults, and women are more often affected than men. Primarily it is due to inadequate oxidation of foods, associated either with excessive absorption of the materials which produce fat, or with incomplete combustion. Fat metabolism is directly or indirectly under the control of the internal secretions. This fact is made plain at puberty, menopause, after marriage, after pregnancy, in eunuchs, and in many other processes where the internal secretions are concerned. Want of exercise, increase in intake of liquids, absorption of large quantities of proteid-sparing foods favor the deposit of fat in the tissues.

The symptoms are manifest mostly in the great bulk, difficulty in walking, shortness of breath, embarrassed cardiac action, and ofttimes arterial disease.

The treatment consists in regulating the diet, systematized physical exercise, massage, and hydrotherapy. The administration of thyroid gland, iodides in small doses, and alkaline purgative mineral waters has been highly recommended.

In obesity associated with erythema, a condition of plethora, I have used venesection with excellent results. In cases of obesity, unaccompanied by untoward lesions, patients express themselves as "feeling fit as a fiddle" for two and three months after a bleeding; 300 to 500 c.c. of blood is

withdrawn in these cases. It is not an unusual thing for patients to tell you that they have had venesection done once or twice yearly for twenty or thirty years.

A manufacturer of 52 came under my service November 1, 1915. Family history was good. He has always been healthy and very active in business affairs. He has been taking on weight the last few years. A well-regulated diet and systematized exercise had failed to reduce the weight. He is a heavy smoker.

The patient complained of shortness of breath, embarrassed cardiac action, and difficulty in walking. Recently he has had intense headache, pain, and some numbness in fingers and legs. The heart and lungs are apparently normal. Secretions flow freely and normally. He is not constipated, sleeps well, and has a good appetite. Urine amber, sp. gr. 1020, acid, and shows indican. Blood-pressure 140 mm. Hg.

The patient came to me to have me do a venesection. He was bled twenty ounces, which gave immediate relief from the headache. He improved much in two weeks. December 2d the patient was bled twelve ounces and the following administered:—

R Extract phytolacca fruit gr. ij;
 Leptandrin gr. $\frac{1}{8}$;
 Strychnine sulphate gr. $\frac{1}{200}$;
 Thyroid gland, desiccated gr. v.

M. et ft. cap. no. j.

Sig.: One three times daily, after meals.

The diet and exercise continued as before. January 30, 1916, the patient had lost 25 pounds in weight. He was improved in every way, and bids fair to make a good recovery.

PLEURISY, ACUTE.

Inflammation of the pleura. It may be divided, according to cause, into primary or secondary; according to extent, into unilateral, bilateral, or local; according to the exudation, into serofibrinous, fibrinous, or purulent. Exposure to cold and wet, traumatism, pneumonia, and pericarditis, cancer, certain bacteria, and infective and toxemic condition, such as acute rheumatism, pyemia, typhoid fever, gout, nephritis, and tuberculosis are etiologic factors.

The disease may set in abruptly with a chill, followed by fever and a severe pain in the side. The pain, usually referred to the nipple or axillary region, is lancinating, sharp, and severe, and is aggravated by cough. Early in the disease a friction rub can be detected. The temperature rises (101° to 102° F.); the pulse becomes full, the respirations increased, and dyspnea develops as the exudate increases. When the effusion has developed, there will be immobility of the affected side, with bulging of the intercostal spaces and displacement of the apex-beat to the opposite side. Dullness, which is movable, may be elicited by percussion. The line of dullness is curved, being higher posteriorly. Above the effusion, a hyperresonant note

(Skoda's resonance) may be obtained. Bronchial breathing may be heard early in the affection, but later the breath-sounds are sometimes weak and inaudible. Vocal resonance is usually diminished or absent, but sometimes bronchophony may be heard. There is also an increase in the anteroposterior diameter of the affected side. During the stage of absorption, the normal physical signs gradually return.

The treatment consists in rest in bed, light diet, and the application of flannel jacket. Pain may be relieved by the hypodermic injection of morphine in the region affected, and by strapping the chest with adhesive. Calomel, jalap, and saline purges may be given with the view of diminishing the effusion. Early and, if necessary, repeated aspiration of the fluid is the most satisfactory method of treatment (Osler).

The use of the Paquelin cautery, wet cupping, or leeches at the beginning of the disease has a salutary effect. If the effusion remains unabsorbed at the end of three weeks or causes dyspnea, restricted diet and potassium iodide, in addition to the above, may be administered.

Whitney maintains that locally a certain amount of revulsion is desirable, both because of the relief it affords and, as some think, in order to diminish pleural congestion. Some authorities still warmly defend the local abstraction of blood by wet cups or leeches (Fraentzel, Bouillaud, Peter); and some go so far as to recommend venesection. There is no question, however, that a certain amount of revul-

sion tends to diminish pain and to add greatly to the patient's comfort.

PNEUMONIA, ACUTE LOBAR.

Pneumonia is called lobar when it invades a lobe, or part of a lobe, without healthy tissue intervening, in contradistinction to lobular pneumonia, which causes isolated or confluent nodules. It is an acute specific disease, due to the pneumococcus of Fraenkel and, less frequently, to other micro-organisms, characterized by a fibrinous exudation into the pulmonary air-cells and bronchioles, and following a course that is more or less typical, the chief symptoms being those of toxemia and of interference with the respiratory and circulatory functions. Pneumonia usually occurs in early adult life, during the winter months, and affects man most often. It may result from surgical operations, ether narcosis, previous attacks, infectious fevers, nephritis, alcoholism, heart disease, gout, cachexias, etc.

The symptoms, diagnosis and prognosis are quite familiar to all students of medicine. The typical cases, when seen early, are not so much to be dreaded. The atypical cases tax the skill of the most competent. When the correct diagnosis has been made, the treatment should be heroic and persistent.

The treatment consists in rest in bed, milk diet, and the administration of calomel and podophyllin, followed by a saline in the early stage. The nervous symptoms may be controlled by hydrotherapy. The heart should be sustained by strychnine and brandy,

atropine, caffeine, nitroglycerin, digitalis, and by hypodermic injections of camphor oil. When cyanosis and dyspnea are extreme, oxygen may be administered. In young, vigorous, and plethoric adults, with hyperpyrexia and a high-tension pulse, bleeding may be beneficial in the first forty-eight hours.

The effect of venesection is best illustrated by one of a series of cases reported by me in 1907:—

CASE 96.—A. S., male, Polish, aged 27, miner; had had diseases of childhood and varioloid. He had used alcoholic beverages freely. He came under my service January 5, 1904.

Clinical History.—Patient had been at a Polish wedding and had chill on the evening of January 3d. The patient on the morning of January 5th had a temperature of 104.5° F.; pulse was rapid, strong, and full; sharp pain near right nipple; respirations 45 per minute; a grunting, interrupted speech; rusty sputum; mahogany blush; herpes; diminished chlorides; pronounced delirium. The two lower right lobes were solidified. January 6th, in the afternoon, as the attendant left the room, the patient got out of bed and out of doors and wandered aimlessly around in the snow, where he was found one-half hour later. I was called immediately and found patient with a temperature of 105.2° F.; pulse 120, marked dyspnea, and superficial blood-vessels were standing out like whip-cords. Tincture of aconite, 4 drops; tincture of digitalis, 5 drops; and strychnine sulphate, $\frac{1}{30}$ grain, were administered, and one-half

hour later sixteen ounces of blood were withdrawn from the median basilic vein. Six hours after the venesection the temperature was 103° F.; pulse 94, strong and full; dyspnea and pain not marked; delirium absent. Strychnine, whisky, and quinine, with an expectorant, were administered. The course was very favorable. The crisis occurred on the ninth day of the disease and convalescence was rapid.

CASES 97-100 were of lobar pneumonia; bled in the first stage of the disease, all within twenty-four hours after the chill. The heart was always relieved and dyspnea mild. Venesection always exerted a favorable influence on general condition of the patient.

The reproach of Van Helmot, that "a bloody Moloch presides in the chairs of medicine," cannot be brought against this generation of physicians. Before Louis's iconoclastic paper on bleeding in pneumonia it would have been regarded as almost criminal to treat a case without venesection. We employ it nowadays much more than we did a few years ago, but more often late in the disease than early. To bleed at the very onset in robust, healthy individuals, in whom the disease sets in with great intensity and high fever, is, I believe, a good practice. I have seen instances in which it is very beneficial in relieving the pain and the dyspnea, reducing the temperature, and allaying the cerebral symptoms (Osler).

Forchheimer believes that venesection has come into disuse, but in the asthenic form of this disease

there is, in his opinion, one indication—an embarrassment of the right heart, characterized by dilatation, great cyanosis, and bad pulse. In these cases from 150 to 350 c.c. may be drawn. The effect is rapid, but unfortunately transitory, and this procedure should be used only in great emergencies, carefully counting the cost to the patient.

Babcock writes that, during the many centuries in which pneumonia was conceived to be a local inflammatory process, bloodletting, both local and general, was so universally relied on that he was a bold man indeed who dared to oppose the method. When at length venesection was abandoned the pendulum swung to the opposite extreme, and he in turn became courageous who ventured to resort to this ancient practice. That the measure did not, however, deserve to sink into utter oblivion is attested by the fact that men of recognized judgment and experience are again advocating the abstraction of blood under definite indications, as will be seen later on. Not so, however, with the administration of tartar emetic and veratrum viride, which, as formerly employed, have deservedly fallen into disfavor. For amelioration of the pain, Babcock recommends that a sinapism be applied to the side or, as was done in von Ziemssen's wards at Munich, one may abstract a few ounces of blood by means of wet cups or by leeches. If venesection is ever justifiable in the *initial stage*, it must be when there are signs of extensive and grave edema. Aufrecht recognizes this as the only indication for venesection at this time, and says he has seen it do good under such circumstances.

In a typical case of lobar pneumonia Thompson opened the median basilic vein and allowed the patient to bleed until he complained of faintness. The effect was immediately noticeable on the pulse, and general condition of the patient. On the third day after the initial chill the temperature dropped to 100° F., on the fourth day the patient got out of bed, and on the eighth day he drove six miles to the doctor's office and was discharged.

In some late cases venesection is also life-saving. I have used it in the typhoid type accompanied with extreme toxemia and venous stasis. Convalescence should be carefully guarded, and tonics, stimulants, and light foods of high caloric value will be found useful in this period of the disease.

PNEUMOTHORAX.

Venesection is recommended in proper cases when there is much venous congestion; I have never used it, but it seems rational in this stage, where life hangs on a thread and loss of blood can be easily compensated for as soon as the patient is relieved of his critical condition (Forchheimer).

POISON, ILLUMINATING GAS.

Poisoning by illuminating gas may be accidental or intentional. In severe or fatal cases the symptoms are: nausea or vomiting, vertigo, unconsciousness, deep coma, and muscular prostration; livid features, stertorous breathing, and frothing at the

mouth. Pulse at first accelerated, later intermittent. Subnormal temperature.

The treatment consists in fresh air, artificial respiration, inhalations of oxygen, venesection, with subsequent subcutaneous or intravenous saline infusion (Strümpell).

The management of patients suffering from intoxication by illuminating gas has been unsatisfactory, because of the affinity of CO for hemoglobin, and lack of knowledge of the pathologic and metabolic processes which the intoxication produces, observes Glenn I. Jones, in a very thorough article on the subject, embracing the chemistry, symptomatology, diagnosis, prognosis, and treatment. Inhalation of oxygen has always been unjustly esteemed in the treatment. The use of oxygen by inhalation is of doubtful efficacy, since it seems improbable that the excess of oxygen over that in normal atmosphere can become physiologically combined with the hemoglobin in exchange for carbon products.

The patient should be taken from the room and into fresh air. The tongue should be retracted from the mouth and so retained by means of a hemostat, improvised gag, or tongue retractor. If necessary, artificial respiration should be begun at once. The patient should be removed without delay to an institution or physician's office, where *immediately phlebotomy should be performed.*

A pint to a pint and a half of blood should be removed, and simultaneously a quart of N₁₀ saline solution transfused in the median basilic or cephalic

vein of the opposite forearm. Venesection can be repeated two hours after the first bloodletting, if the patient be not doing well. Saline solution should be given subcutaneously every two hours in quantities of one pint, or by the rectum continuously. Saline solution diminishes toxemia, lessens the tendency to edema of the lungs, increases the affinity of the red cells for oxygen, and stimulates the circulatory system. At the outset the patient should be given, by hypodermic injection: ether, 30 minims; atropine, $\frac{1}{100}$ grain, and suprarenalin, 30 minims.

I would suggest the use of Loeb's or Adler's solution instead of the so-called normal salt solution, as they conform more nearly to the necessary constituents of normal blood.

PULMONARY HYPEREMIA.

Should acute dilatation of the right ventricle and marked signs of stasis in the systemic veins be present and the state of the pulse portend danger to life from paralytic overdilatation of the cardiac chambers, recourse should be had to prompt bloodletting. A vein in the arm may be opened without needless delay, and twenty to thirty ounces may be allowed to flow.

Should the stagnation be such that relief is not afforded, then one may without fear resort to aspiration of the right auricle. An aspirating needle may be thrust into this chamber close to the right border of the sternum, care being exercised to avoid wounding the internal mammary artery which

passes from one-fourth to one-half inch from the edge of the bone. This procedure is not dangerous since the myocardium endures puncture with a fine needle without subsequent bleeding from the wound. Since, however, this operation is advisable only in cases of grave danger to life, the risks of the puncture are not to be weighed against the disastrous consequences of delay or a too timid treatment (Babcock).

RHEUMATISM, ARTICULAR.

Rheumatism is a constitutional disease the cause of which has not yet been determined, and is characterized by high fever, inflammation of the large joints, acid sweats, and severe blood dyscrasia. It may be acute or chronic, and is greatly influenced by heredity, damp climate with sudden changes in the temperature, exposure to cold and wet, fatigue and overwork.

The onset of the affection is usually sudden, although anorexia, sore throat, vague pains, etc., may precede. The inflammation first attacks the large joints, and may subside quickly in one joint to attack another. It is attended by high fever (103° to 104° F.), rapid pulse, and profuse acid sweats. The urine is scanty, highly colored, and contains an excess of uric acid and urates. Hyperpyrexia, organic heart disease, pneumonia, pleurisy, cerebral symptoms, various cutaneous eruptions, and rheumatic nodules may occur as complications. The prognosis is guardedly favorable.

The *treatment* consists in rest of the parts, protection of the body and joints with flannel or soft wool. Restricted diet is essential. The bowels should be moved freely by calomel, soda, and podophyllin, followed by saline purgative. Salicylate of soda, 60 to 120 grains in twenty-four hours, is of considerable service. Antipyrin may be administered with the salicylate to good advantage. The use of methyl salicylate in form of an ointment is often advocated. The patient should drink milk, lemonade, and Vichy water. Subcutaneous injections of small doses of morphine or pure water in the neighborhood of the diseased joint, twice daily, may give relief. Hyperpyrexia with threatened cerebral troubles may be treated by hydrotherapy.

The treatment of chronic articular rheumatism may thus be summed up: Internally, preparations of iodine and arsenic; externally, painting with tincture of iodine over the diseased joints. Hydrothermal cures, sulphur, or arsenical baths may be prescribed.

As a rule, in the treatment of gonorrheal and puerperal arthritis, we employ the drugs used in true rheumatism. These affections must be treated from the onset by energetic local measures, such as bleeding, leeches, cupping, blisters, and the cautery. Trousseau's cataplasm has been used with some success in these cases. Superheated air (125° C.) is a valuable agent in the treatment of these forms of arthritis.

During the last century and the first half of this, rheumatism was regarded as a "phlegmasia," as

an inflammation dependent, like other inflammatory affections, on exposure to cold, and differing from them only in the nature of the textures involved. The treatment of inflammation was at that time essentially antiphlogistic, and consisted in the adoption of various means of depletion. The chief of these was bleeding.

Sydenham wrote, in 1666, that "the cure of rheumatism is to be sought by bloodletting." His rule was to take ten ounces of blood as soon as he saw the patient, to repeat the operation the following day, to do it again in a day or two, and, for the fourth and generally the last time, three or four days later. But he was not satisfied with the results of this practice; for in 1679, ten years before his death, he says, in a letter to Dr. Brady: "I, like yourself, have lamented that rheumatism cannot be cured without great and repeated losses of blood. This weakens the patient at the time; and if he have been previously weak, makes him more liable to other diseases for some years. Reflecting upon this I judged it is likely that diet, simple, cool, and nutritious, might do the work of repeated bleedings, and save the discomforts arising therefrom. Hence I give my patients whey instead of bleeding them." He gives the particulars of a case treated dietetically, in which the patient "recovered his full strength, escaping all such discomforts as, ten years before, a similar attack, which I treated by bleeding, had entailed upon him."

Cullen, though he regarded bloodletting as "the chief remedy of acute rheumatism," and taught that

"large and repeated bleedings during the first few days of the disease seem to be necessary," was careful to add that "to this some bounds are to be set; for very profuse bleedings occasion a slow recovery and, if not absolutely effectual, are ready to produce a chronic rheumatism."

Though the indiscriminate use of the lancet was condemned by many able observers, such as Haberdan, Fowler, Latham, and others, bleeding continued, till well into this century, to be the sheet anchor in the treatment of this disease.

In undertaking the treatment of acute or sub-acute rheumatism, whether we view the inflammatory state of the aponeurotic membranes as primary and idiopathic, or secondary and symptomatic, it is necessary in the first instance to adopt the antiphlogistic method of treatment, and to carry it on with some degree of energy, and to a considerable extent.

"The different branches of the antiphlogistic regimen requisite in the treatment of rheumatism are: bloodletting, general and local; the occasional employment of cathartics, the occasional employment of emetics, especially tartar emetic, the use of diaphoretics, and the use of revellants.

"*First*.—General bloodletting, in order to be beneficial, ought to be performed early in the disease, and carried to a considerable extent. . . . It should be carried at first to twenty or thirty ounces if possible, and within twenty-four hours to as much more.

"*Second*.—The influence of general bloodletting

must be aided by the conjoined operation of various adjuvants. Full vomiting produced by ipecacuanha and antimony is, in the majority of cases, requisite; and complete evacuation of the bowels by eccoprotics and even cathartics is quite indispensable.

“Third.—It is of the utmost importance, in attempting the thorough removal of rheumatic pains, to conjoin with bloodletting, or, after its use, the administration of full doses of tartrate of antimony.

“Fourth.—It is of great moment, if the bowels have been previously well opened, to exhibit, after the first bloodletting, an opiate of 40 or 50 minims of the solution of the muriate of morphine; or if the bowels have not been freely moved, to effect this indication, and take a second bloodletting. After this to administer the opiate, which may either be given alone or conjoined with antimony.” So wrote Dr. Craigie in 1840. In that year appeared also Bouillaud’s *“Traité Clinique du Rhumatisme Articulaire,”* in which the treatment by bleeding *coup sur coup* was advocated with characteristic ability and energy.

To Bouillaud, indeed, belongs the credit of having systematized this mode of treatment. The full extent of his credit in this respect was not generally recognized. Previous to his time the practice of phlebotomy was wanting in method. To take so many ounces of blood, and to repeat the operation in one, two, or more days, was all the recommendation. Bouillaud insisted that there should not be too long an interval between the bleedings—that the second

should be had recourse to before the effects of the first had fully passed off, and the third before the benefit of the second was lost. That is what he meant by his recommendation to bleed *coup sur coup*. It was the frequent repetition of the operation, rather than the quantity of the blood taken, which formed the characteristic feature of his mode of treatment. If the pathologic views which then prevailed were correct, and if the bleeding were the important therapeutic agent which it was believed to be, there can be no doubt that Bouillaud's idea was therapeutically sound. No single dose of any remedy could stop a disease like acute rheumatism.

It would have to be repeated from time to time; and to get its full beneficial effect the second dose would have to be given before the first had quite ceased to act. Bouillaud's merit consists in having applied this sound therapeutic rule to the practice of phlebotomy.

About the middle of the century the practice of phlebotomy and the pathologic views on which it was founded were vigorously assailed. Facts tended to show that patients recovered more quickly and satisfactorily when they were not bled than when they were. This was noted in acute rheumatism as in other acute diseases. The rapid accumulation of such facts produced a marked reaction against the old mode of treatment, and within twenty years of the time that Bouillaud's book appeared, the practice of bleeding in acute rheumatism was all but abandoned. Other remedies besides bleeding were used to allay the inflammation (Maclagan).

In *pericarditis* especially, local treatment is sometimes of much service. In the early stage of a severe attack, when pain is a prominent symptom, when the heart's action is disturbed and tumultuous, and when there is evidence of serious interference with the circulation, much good may be got by the abstraction of a few ounces of blood. This may be done by opening a vein, or by the application of leeches or cupping-glasses over the region of the heart. If the symptoms are urgent, venesection affords the most speedy relief; but to do good it must be had recourse to at an early stage. The cases are few, however, in which the desired effect may not be got from leeches.

In entertaining the question of bleeding, local or general, it must be borne in mind that the acute stage, when got over, is followed by one in which there is apt to be considerable debility. If bleeding be had recourse to unnecessarily or too freely, this stage will be rendered more marked and prolonged. The mere existence of acute pericarditis is not a reason for taking blood; such a measure is to be regarded only as the best means of allaying the urgent symptoms of the first stage of the acute attack (Maclagan).

Notwithstanding the arguments against venesection in acute articular rheumatism, I have noted its salutary effects in so many cases that I cannot feel other than that it is indicated in the majority of cases. The great trouble has been that bleedings have been used indiscriminately without regard for indications, and these alone depended upon to cure the

patient. It should always be borne in mind that venesection is only an adjunct in the treatment of disease, and not a panacea. A venesection of 300 to 500 c.c., repeated if indicated, at the onset of acute articular rheumatism, reduces the amount of toxins in the blood, which incidentally reduces temperature, quiets the pulse, relieves congestion of the kidneys, and facilitates the action of drugs.

SUNSTROKE; HEATSTROKE.

A depression of the vital powers the result of exposure to excessive heat, to the direct rays of the sun, to artificial heat in confined quarters, or to diffused atmospheric heat without proper ventilation. Bodily fatigue, the use of tobacco, overcrowding, intemperance, and humidity of the atmosphere are predisposing causes. The condition manifests itself as acute meningitis (rare), heat-exhaustion (common), and true sunstroke.

Heat-exhaustion is characterized by a rapid feeling of weakness and prostration, cool surface, pale face, weak voice, rapid and feeble pulse, increased respiration, disordered vision and hearing, and partial or complete unconsciousness.

Sunstroke is manifested by insensibility, with or without delirium, convulsions, or paralysis, flushed and hot surface, injected conjunctivas, rapid and shallow or labored and stertorous breathing, quick pulse, axillary temperature from 105° to 110° F., and suppression of all glandular action.

The *prognosis* of heat-exhaustion is favorable if

it is promptly and properly treated. *Sunstroke*, in the majority of cases, terminates unfavorably, usually in from one-half hour to several hours.

Treatment in heat-exhaustion requires the recumbent posture, the external application of heat, and the use of stimulants. *Sunstroke* requires reduction of temperature by cold baths, cold pack, etc., and the hypodermic use of quinine or antipyrin. Convulsions and restlessness may call for morphine. Depression will necessitate the administration of strychnine and other stimulants.

In the cases in which the symptoms are those of intense asphyxia, and in which death may take place in a few minutes, free bleeding should be practised, a procedure which saved Weir Mitchell when a young man (Osler).

Occasionally, when the right heart is much dilated, venesection may be valuable, but it should be used only for this indication; indiscriminately used it does harm. Local bloodletting, by leeches or cupping, is more generally applicable; leeches at the temple or behind the ear, cups along the spinal column (Forchheimer).

Flint states that on August 9, 1862, 8 cases of coma from sunstroke were admitted into Bellevue Hospital, of which 7 died. In the last case admitted, in which the coma was as profound and the symptoms generally as unfavorable as the others, the pupils were contracted, breathing stertorous, skin hot and dry, pulse full and frequent; bleeding was resorted to mainly because of the fatal termination of all others, sixteen ounces being taken from

the arm and the temples being freely leeches, and on the following day the patient was comfortable, complaining only of debility. In the summer of 1864, Flint had a similar aggravated case in which the abstraction of eighteen ounces of blood and the cold douche constituted the treatment. Consciousness returned in an hour and a half after the venesection, and the patient was discharged the following day quite well. Nevertheless, the practice has few advocates in our own country, and is generally condemned by British and East Indian practitioners, who with equal unanimity depend upon the cold douche. "While venesection may do good in some cases," says Wood, "in by far the majority of cases it does absolute harm."

One of the exceptional cases in which it did undeniable good was that of Dr. S. Weir Mitchell, who having overheated himself by walking in the sun and making considerable muscular exertion, all of a hot August day, became unconscious after dining and remained so for ten days, being treated by cold applications, etc., finally recovering consciousness after a prolonged hot mustard foot-bath, and when able to speak insisted so positively upon being bled that twenty-five to thirty ounces of blood were abstracted, with immediate relief and speedy recovery, when meningitis and permanent mental derangement might otherwise have been the unfortunate and most regrettable result (Gihon).

SYPHILIS.

A chronic, constitutional, infectious disorder, transmitted by contact and inheritance, and characterized by an incubation period of from ten to thirty days, and certain different stages. A complete delineation of the disease and its various manifestations will be found in most textbooks on the subject.

The treatment of syphilis in all cases should be directed toward the general health, and tonics, stimulants, nutritious food, and fresh air should freely be allowed. The classic and specific remedy, mercury, should never be lost sight of in our enthusiasm for the newer arsenic preparations. Erlich's 606, hectine, and the cacodylate of soda are very efficient when followed by mercurials; otherwise many relapses can be anticipated.

There are many cases that do not respond readily to treatment because of high blood-pressure, or high specific gravity and viscosity of the blood. A case, previously reported by me, was as follows:—

CASE 21.—E. B., aged 20, single, miner, came under my service October 21, 1903. Patient had usual diseases of childhood. His previous health had been good. He was a man of exceptional physical strength.

Clinical History.—Patient stated that the chancre made its appearance about thirty-five days after coitus. Rheumatoid pains, headache, neuralgia, induration and enlargement of lymphatic glands rapidly followed; cutaneous manifestations were in evidence early.

The protoiodide of mercury was administered three times daily; beginning with $\frac{1}{3}$ grain, it was gradually increased until patient was getting 2 grains three times daily at the end of two months without noticeable improvement. Mercury bichloride $\frac{1}{5}$ grain was injected into gluteal muscles once weekly for six weeks without any perceptible impression. February 10, 1904, the median basilic vein was opened and eighteen ounces of blood withdrawn. Patient was given enema of 2 quarts of albumin-water. He did not show any signs of weakness. There was an increase in pulse rate from 72 to 84. On February 11th, I began the administration of the protoiodide of mercury in $\frac{1}{3}$ -grain doses three times daily, and increased $\frac{1}{3}$ grain every second day. At the end of the sixth week after venesection the patient had gained in weight, mucous patches and eruptions had disappeared, and the patient's general condition was much improved. Treatment was continued for one year. No manifestation of syphilis has since appeared.

TRANSFUSION.

The transfer of blood from one person to another; the introduction of blood from the vessels of another person; also the introduction into the blood-vessels of any substance, as saline solution. In this discussion I refer to the direct transfer of blood from one person to another without exposing it to air. It is indicated after hemorrhages, in pernicious anemia, purpura, and various blood dyscrasias.

A. A. Berg, of New York, says that with the modern technique transfusion of blood from one person to another is entirely free from danger. The blood flows directly from one blood-vessel to the other without encountering any foreign body, it being always in contact with the healthy living intima. The dangers under the old method were clotting of blood in intermediate tubes, and the carriage of the emboli into the vessels of the recipient. Another danger has been the hemolysis of the blood from contact with the blood of another. A test can be easily made to ascertain whether the two samples of blood will mix without hemolysis. Skill with the needle will insure success in uniting the two blood-vessels, the artery of the donor and the vein of the recipient.

The amount of blood transfused must be regulated by the increase in hemoglobin of the recipient and the blood-pressure. Berg maintains that the indications for transfusion are severe acute hemorrhage, some cases of shock, and changes in the blood which favor hemorrhage. In which of these conditions we may successfully use transfusion is not yet fully ascertained. It is of value in preparing feeble and exsanguinated patients for major operations. It is very useful in poisoning from illuminating gas.

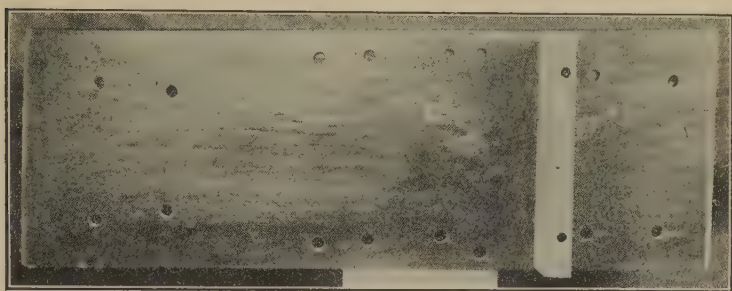
The transfusion of physiologically unaltered blood is held by Vogel and McCurdy to be one of the most promising forms of palliative treatment available in pernicious anemia. The number of cases on record in which a remission of notable

degree and considerable duration has followed immediately on a transfusion is so great as to make it impossible to regard these results merely as coincidences. If proper precautions are taken to select a healthy donor, and by the usual tests for isohemolysins and isoagglutinins the serum and corpuscles of donor and recipient are found mutually congenial, there is no danger, and the measure should be employed earlier in the disease instead of waiting until the patient is in a desperate condition. There is evidence in favor of the view that greater judgment and accuracy are needed in determining the amount of blood transferred. It is quite possible that too large an amount of transferred blood may be injurious, and that more benefit is to be expected from small doses introduced at intervals to be determined by the progress of the patient. The enumeration of the reticulated cells by means of the method of vital staining affords a useful means of gauging the hemopoietic activity of the bone-marrow, and by watching the patient's progress in this way the indications for and effects of various therapeutic measures can be determined and supervised.

The donor is preferably a healthy young man. If no near relative is available, recourse can be had to a convalescent patient. One should be sure in advance that a number of these are at hand. Tests of the agglutination and hemolysis do not seem to be as important as was formerly supposed. The Wassermann reaction, however, is important and indispensable, except in absolute urgency.

During the transfusion the two subjects are

placed on tables of the same height, the donor on one which can be lowered. The radial region of the donor and the paramalleolar region of the receptor are bathed with iodine and anesthetized with stovaine. We commence by preparing the "receptor." The internal saphenous vein is exposed at the lower third of the leg by an incision three and one-fifth inches long, the vein has been made prominent by slight compression at the upper part of the incision, is freed by dividing and tying all small



Operating board for baby used by Dr. V. D. Lespinasse in
"direct transfusion of blood."

veins holding it in place. This done, the surface of the wound is covered with liquid vaselin and protected by a compress wet with salt solution, and the preparation of the donor's arm proceeded with. The radial artery is isolated for two inches; there are a few collaterals. If these are troublesome, they can be tied with fine silk and divided. The artery, well freed, is tied and severed at the lower end of the wound. A serrefine is placed on the artery at the upper end of the denudation, and care taken that it does not become displaced.

The saphenous is tied, completely divided at its lower end, and freed for two inches. The vessels are now drawn through a cannula of McGrath's

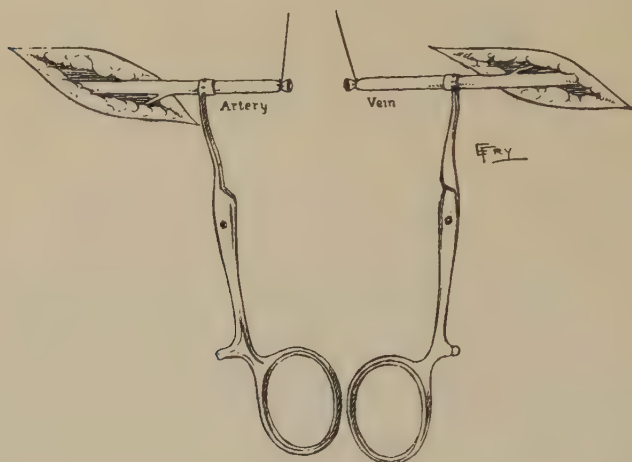


Fig. 1.—Vessels drawn through cannula by means of ends of ligatures.

transfusion forceps, as shown in Fig. 1, by means of ends of ligatures. Then the vessels are cuffed and fixed on sharp hooks (Fig. 2) and the lumen washed

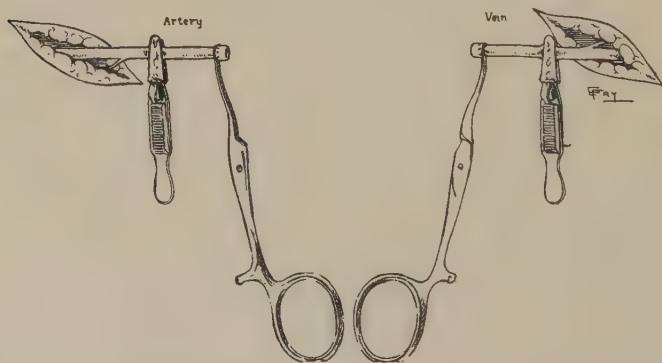


Fig. 2.—Vessels cuffed on cannula and fixed on sharp hooks.

out. The forceps are lightly clamped (Fig. 3), after allowing blood to flow from cannula. The hemostats on the artery and vein being removed, the latter becomes swollen and systolic pulsations are felt in it.

During the whole time of the operation, the vein is inspected every two minutes to see if the blood is entering freely, taking care to palpate one-half inch above the anastomosis to avoid mistaking the propa-

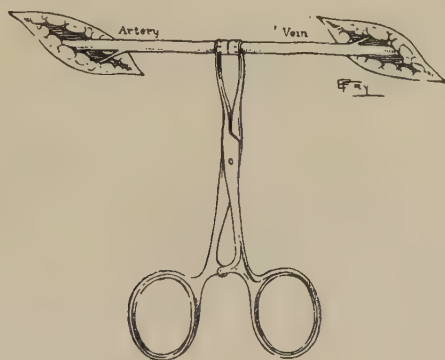


Fig. 3.—Forceps lightly clamped after allowing blood to flow from cannula,—“a simple instrument for transfusion.” (McGrath.)

gation of the arterial pulse for an expansion of the vein. If great precision is desired, an assistant notes the exact moment at which blood begins to pass; another takes the blood-pressure of both subjects. Finally the assistant tests the hemoglobin strength every three minutes. As a rule, the donor experiences nothing unusual; rarely there is some thirst. If he becomes pale, the head is lowered, though Tuffier has never found it necessary. The receptor notes a sensation of warmth, sometimes an anxious

feeling, the lobule of the ear reddens, then the conjunctivæ, also the lips and cheeks.

It is impossible to calculate the time the transfusion should last. The amount passing through the union is not constant and varies with the contraction of the artery above the anastomosis. The absence of any unfavorable symptom on the part of the donor, the coloration of the receptor, the normal strength of the blood in hemoglobin, the duration of the passage of blood, and the force of the pulsation in the vein are so many factors enabling one to estimate the transfusion is sufficient and injurious to neither subject. If everything is favorable, the duration varies from fifteen to twenty-five minutes.

The transfusion finished, the artery is tied above the cannula and divided between the cannula and the ligature; the vein is tied below the cannula with catgut and severed in such a manner that all segments are removed. Both wounds are filled with liquid vaselin, the skin united with Michel clips, and an antiseptic dressing applied to both donor and receptor. The choice of the cephalic or saphenous veins will depend on the receptor; if the latter has to be moved after transfusion, if there are varicose veins, or subcutaneous fat is unusually thick, the cephalic should be chosen. When the receptor is an infant the femoral may be selected.

After the operation, the urine, blood, and blood-pressure are examined daily. The urine remains normal; the red cells increase greatly, from 1,700,000 to 3,600,000, and this increase is kept up for the following days. The hemoglobin curve is at first

parallel with that of the number of red cells; then the two diverge, the hemoglobin curve bending, due to the fact that this represents the new cells (Murphy).

UREMIA.

A toxemia developing in the course of nephritis or in conditions associated with anuria. The nature of the poisons is as yet unknown, whether they are the retained normal products or the products of an abnormal metabolism.

The symptoms are especially referable to the nervous system, and include such premonitory signs as headache, vertigo, nausea, indistinct vision, drowsiness, constipation, scanty urine, which may contain albumin, etc. The uremic seizure may manifest itself by marked gastrointestinal disturbances, convulsions, or coma, with more or less rise of temperature, nocturnal dyspnea, Cheyne-Stokes breathing, vomiting, diarrhea, dry skin, scanty albuminous urine with casts, etc. The prognosis is always grave.

The *treatment* should be directed toward elimination of the poisons. Milk diet is of prime importance in this condition. The milk diet should be continued for months; if it does not agree well, it should be replaced by a mixed diet of fresh vegetables, farinaceous foods, cakes, fruits, with some white meat. Tonics and injections of cacodylate of soda may prove useful at this period (Dieulafoy).

Massage, vapor baths in mild form, and cutaneous stimulation with high-frequency current are

useful. Counterirritation over the kidneys is indicated. Trousseau's wine, digitalis, diuretin, or theobromine should be employed when the heart is failing and the edema is persistent. Theobromine, 30 grains daily, is said to produce diuresis and dechlorination.

Croton oil (gtt. j) and olive oil (ʒj) should be administered at once, and later elaterium (gr. $\frac{1}{8}$), calomel (gr. ij), and compound jalap powder (gr. xx) should be prescribed in the acute attack. Chloral (ʒj), nitrite of amyl, or chloroform may be needed to control the convulsions.

In uremia with acute delirium, epileptiform convulsions or coma, and acute edema of the lungs, bleeding should be employed up to about ten ounces, and repeated as may be necessary. Bleeding, if properly employed, gives excellent results, and often arrests the convulsions, which are likely to be fatal. Improvement obtained is due to two causes: first, bleeding facilitates the absorption of the visceral edema; and, secondly, it withdraws a considerable quantity of the uremic poison. In the absence of bloodletting, leeches may be applied behind the ears or in the lumbar region.

In uremic dyspnea, which may be most severe, bleeding usually gives relief. Uremic headache is relieved by the application of leeches behind the ears and by antipyrin in doses of 15 to 20 grains daily (Dieulafoy).

Kottmann extols the advantage of venesection in uremia. In uremia the venesection removes part of the toxins and relieves the brain of the almost

invariable local edema while also withdrawing some of the toxins there accumulated. The brain-cells in uremia are likely to retain waste products and salt, and these may in turn attract water, this effect promoted by nephritic injury of the blood-vessels, including those in the brain. This explains the marked and almost instantaneous relief experienced from venesection in uremia, even when the edema in the brain is still clinically latent. *It also explains why is it wrong to follow the venesection with infusion of physiologic salt solution, which in its turn may induce new injury to the brain.*

Von Reiter has written an interesting little brochure on "Venesection and Saline Injection in Uremic Disturbance." He finds that in uremic disturbances of acute nephroses infusion of saline solution after venesection is an efficacious treatment and its employment is unconditionally indicated. In the uremic disturbances of chronic nephroses the favorable effect of venesection and infusion will depend upon the degree of the anatomic lesion of the kidney.

I am inclined to believe with Kottmann, that saline solutions are contraindicated in uremic conditions. I advise injections of sterile water, or water so modified that it will meet the normal demand of the system. As in all toxic conditions of the blood, drastic purgatives must not be given to uremic patients, because the purgative robs the system of fluid necessary for the secretion of the urine.

Singer advocates venesection as the most rational

and beneficial measure in *scarlatinal uremia*. It is especially indicated in cases showing symptoms indicating irritation of the brain. When there is a tendency to coma and depression, venesection can do no harm, but not much can be hoped from it at this stage. It is applicable to both robust and weakly children. If the pulse is filiform, the internal organs are generally irreparably injured at this stage and the operation is generally useless. Venesection should be done as early as possible, during the first uremic attack. The amount of blood to be withdrawn must be decided by the age, strength, and severity of the attack. Venesection can be repeated at need after twenty-four to forty-eight hours.

Baginsky thinks that from one-fifteenth to one-twentieth of the total amount of blood can be let out without danger. In Singer's 17 cases of acute scarlatinal uremia treated by venesection, all the patients recovered but two, that is, the mortality was 12 per cent. In the 9 cases treated without venesection the mortality was 56 per cent.

Osborne sums up the treatment of uremia as absolute muscle rest; the withholding of all food, not even giving milk; administering very little water by the mouth even if there is no edema, as the ability of the kidneys to excrete water, even, is often abolished; frequent colon irrigations of hot water, leaving some in the colon for absorption if the blood-pressure is low and there is no edema; the administration of thyroid; hot sponging of the skin; venesection in most cases, repeated if necessary, as *it*

has been shown that an ounce of blood will remove more toxins than eight or nine times that of fluid feces or than quarts of perspiration; and the administration of nitroglycerin if the pulse tension is high.

VISCOSITY OF THE BLOOD.

Bachmann advises determining the viscosity of the blood in connection with hemoglobin, the experiences showing that the hemoglobin divided by the viscosity gives a quotient which is nearly constant in health, but which varies widely in different diseases. In pneumonia the viscosity is increased; in typhoid it is reduced, as also in chronic interstitial nephritis. In thrombosis the viscosity may range from average to maximal figures. The higher the viscosity, the graver the prognosis. In epidemic meningitis the viscosity is always pronounced.

Boveri, of Milan, reported to the Italian Society of Internal Medicine, that there exists a relationship between the viscosity of the blood and arterial tension.

In neuroarthritic subjects the viscosity of the blood is almost always increased, as is also the arterial tension. He obtained excellent results in such cases by bleeding, not a large quantity, but in small amounts (100 to 120 c.c.) three or four times a month. Of course in acute cases, as uremia or pulmonary congestion, he would draw greater quantities. In these chronic cases, where he bled them at intervals, he found that the viscosity as well as the arterial tension remained lowered.

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